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Improved Core Output from Smaller Space

By Providing Improved Working Conditions for Girl Core-Makers, Better Product and a Higher Type of Employee Have Been Secured

BY moving the core room from the north end of the plant to the extreme south end, and building an addition for girl workers, the capacity of the General Electric Co. foundry at Pittsfield, Mass., was recently increased from 50 to 60 tons daily. The original core room, immediately in the rear of two large continuous melting Whiting cupolas, has been converted into a machine molding department. Added benefits derived from this rearrangement are the minimizing of losses in temperature and a reduction in the time necessary in handling molten metal.

Approximately 13,000 sq. ft. floor space was devoted formerly to core making. The new girl core-making department involved 2530 sq. ft. additional plant floor space, but by the rearrangement of the general core-making layout the total space now devoted to core-making, including the new addition, is reduced to 9880 sq. ft., or more than 3000 sq. ft. less than before. The relation of added core-making floor space to increased output capacity, therefore, is all the more striking, and at once suggests, as is the case, improved manufacturing practise based on new production principles and modern equipment.

This plant is given over largely to the manufacture of transformer iron castings, necessitating accurate and high grade core work. Previously, cores were largely made by male help. An elaborate system of

rails on which drying cars ran to and from the ovens occupied much valuable space, and necessitated larger handling and other core charges than desired. In planning the new core department, the number of women employees was increased, while the number of male core makers was diminished. And the question of Americanization as related to the problem took a new angle, due to the character of the foundry employees.

Effect of Comfort on Efficiency

Previous core-room standards, as related to working surroundings, are practically ignored in the construction of the new department. The utmost consideration has been given details looking to the comfort of girl employees, and its bearing on efficiency. The investment represented in this plant addition and its equipment, amounting to between \$40,000 and \$50,000, bears out this statement. Here, exceptional construction and arrangement features are to be found. Quality of work, volume of output, and elimination of core breakage are largely founded on the concentration of the girl's mind on what she is doing, by eliminating excess operations, on sanitation and on privacy.

The new department consists of the core room, and locker, wash and rest quarters. It adjoins the larger core room, four exits, 5½ ft. wide by 7 ft. high, con-



The Walls, Convenient Work Benches, Everything at Hand and No Outside Disturbances All Contribute to the Efficiency with Which This Core Room Force Functions. At extreme right, a corner of the metal containers for core sand may be seen, with two outlets near the floor

necting the old and the new rooms. These exits have quick-acting roll-type metal doors. The new core room is 72 x 28 ft. and finished in white. The walls are of glazed white tile, extending 6 ft. from the floor, and of smooth brick, painted with cream white enamel, from the top of the tiling to the roof. The roof and steel trusses are finished in cream white enamel. The flooring is of dark gray cement, which does not show stains, and is tapered to drains.

Dust proof corners are provided everywhere, and the tiled walls are washed down and the floors flushed off every night. Water connections are available at regular intervals along the outside wall of the room, which serve girls working at benches as well as the night cleaners. All working equipment in this room is raised several inches from the floor, to facilitate cleaning operations. The place is heated by steam, thus is quickly dried after being washed in fall and winter months. There are two large skylights, with generous ventilators, on the roof. These skylights and numerous large windows insure an abundance of light and fresh air. Artificial light is furnished by large candlepower drop lights inclosed in attractive glass shades.

Privacy a Large Factor

Girls enter and leave their core room by a private stairway located between their locker, wash and rest quarters and the large core room. Their doorway is 700 ft. away from the nearest point where male employees enter and leave the plant, and has quick access to a highway outside the jurisdiction of the company. The girls have their own time clock, located where they naturally pass to and from the stairway and the locker and wash quarters.

Bench accommodation is provided for thirty-two girls, who are under the supervision of a forewoman. The benches are made of hard wood with metal coverings and have cylindrical metal supports. Each girl

is provided with a jolt machine, air operated, of the large shockless type, fitted into the bench so that, when not in operation, its top serves as part of the table, a compressed air system for cleaning core boxes and tables, and a heavy metal core stand, designed with a substantial base, to insure against tipping over and allowing finished work to drop to the floor. On one end of each bench is an auxiliary table containing a metal pail for holding cutting fluids.

Because of the character of the core work required, great care is used in the selection and treatment of sands. These are mechanically mixed by machines two stories below, and conveyed to the core making floors by bucket and chain hoists. For the new core room, the sand is delivered by metal chutes from the hoists to two containers 9 ft. long, 4 ft. deep and 6 ft. high. These containers are covered by glazed tile and located between exits to the large core room, and within easy access of girls working at the benches. They are divided into two equal sections for the different mixtures of sand. The outlets, on a level with the flooring, have protective metal pieces which prevent sand from running out on the floor.

For holding nails and brads, two series of bins, constructed of heavy wood and supported by iron legs, are stationed between two exits, within easy reach of the girls. Practically all core box equipment is of aluminum and made in multiples, hence the operator has a complete plate of cores with which to work. The weight of the core boxes, sand and drying plates governs the number of cores made in one plate. Core rods are shaped by men in the large core room, and then delivered to the girls. It therefore is apparent that each girl is furnished with everything needed for her work, either at or in close proximity to her bench. Time required to obtain sand and nails is minimized, and there is no other excuse for her leaving the bench to complete her work.



Section of the Main Core Room, with One of the Doorways at Left (White) Leading into the Women's Core Room. In front of the door is a core rack on the electric truck which carries the racks to and from the ovens



In the Women's Rest Room Are a Regular Hospital Bed and Plenty of Chairs. Each girl has her own white sanitary locker, and the washing facilities are attractive



Core racks, 4 ft. 3 in. wide, 5 ft. 6 in. high and 5 ft. 6 in. long, with adjustable shelves, are run from the large into the new core room and stationed in spaces between benches. These racks are picked up, set down and transferred by Baker R. & L. Co., (Cleveland) type C electric trucks, operated by one man. Stations in the new core room are in direct line with exits, consequently a truck does not have to twist or turn while placing racks between benches, and little time is thus consumed in the operation. After a girl runs up her core box, she lifts it from the stand and places it on the drying rack, this operation necessitating but one or two steps.

Cores Not Handled Between Making and Using

From the core room, the racks are run into ovens having a capacity for two racks. There are six of these ovens and one draw type on the end of the battery, all oil fired and well insulated, each having a recording thermometer. After the cores are dried, the racks are delivered to the storage department by the electric trucks, where each remains until all cores it carries have been used by the molders. In this practice the cores remain in the same position, from the time they are placed on the racks by the girls in the core room until they are lifted from the racks by the molders. Excess handling therefore is eliminated, and breakage reduced to practically nothing.

All girl core makers are on a piece work basis. The only other help used in connection with the new core department is the man who operates the electric trucks, and the two men employed at the sand mixing machines. As their time is devoted equally with mixing sands for the large core room, costs involved here are very small. In addition, piece work charges for shaping core rods by men must be figured into the operations. Increased production and the better quality of the work turned out have more than compensated the General Electric Co. for the investment, however.

The locker, wash and rest room, which is 24 x 28 ft., leads out of the core room. It is finished in glazed tile throughout and has a dark colored cement floor tapering to drains. A large skylight, with the same style of ventilation as in the core room, is provided, and there is plenty of natural and artificial light,

which, with washing down every night, keeps the quarters clean and refreshing. In the locker and wash room there are two toilets and a battery of wash stands with hot and cold water, everything being of porcelain and having nicked fixtures. Two mirrors are provided, and each girl has her own white sanitary locker.

Partitioned off from the wash and locker quarters is the rest room, which contains a regular hospital bed, chairs, tables, wash stand and an electric heater to allow the girls to prepare something hot for their lunch. Here the same color scheme is carried out as elsewhere. The company furnishes a victrola and a certain number of dance records, which are kept in the core room and used only during noon hours. A large number of the girls employed in the new core room are taking a lively interest in the various company classes, with a view to bettering themselves educationally.

The management has proved to itself, and to girl workers, that the core room of a foundry can be made one of the most satisfactory departments of such a plant, from the standpoint of both employer and employee. Since this core room first was placed in operation, the personal character of the individual girl employed there has steadily improved, due to a higher and still higher class of workers being attracted by working conditions and surroundings, and to the influence of surroundings and conditions in molding the social standing of the individual, especially those born in foreign lands or of foreign parentage. Naturally, the standard of cores produced progressively improves, as the character and educational qualifications of the individual girl worker improve.

A meeting on engineering financing is to be held at the Engineering Societies Building, New York, on the evening of Oct. 19. It will be a joint meeting participated in by the New York sections of the mechanical, electrical, civil and mining and metallurgical engineering societies.

The Hyatt Roller Bearing Co., New York, has obtained the contract for furnishing Hyatt roller bearings on the mill tables required for the new mills at the International Nickel Co. and the Mansfield Sheet & Tin Plate Co.

Two Principles in Hot Drawing

In his paper before the Iron and Steel Institute, on the subject of Hot Drawing on the Mandril, Eugène Schneider brought out forcibly two principles relating to practise in that work. Extracts follow:

Under like conditions of temperature, and with dies whose surfaces of contact are in the same state, the resistance to displacement increases as the angle of contact decreases.

In other words, for a given pass, the greater the angle of contact, or the smaller the connecting radius, the less becomes the power necessary for drawing. If the angle of contact θ is very small (Fig. 1) the value of $\cot \frac{\theta}{2}$ is very great, consequently the friction increases, and, due to the normal reaction, the metal tends to wedge instead of to be displaced.

If, on the contrary, assuming always the same re-

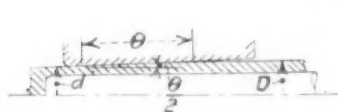


Fig. 1.



Fig. 2.

duction of section, the angle of contact θ is very great (Fig. 2), $\cot \frac{\theta}{2}$ decreases and the friction becomes

negligible. The power necessary then becomes in the neighborhood of the minimum. The section of the metal to be displaced works at this moment under shear, and the effort of drawing can create tears on this section.

From this it appears that it is advantageous to employ dies of small connecting radius. However, to avoid tearing the metal, which would result from a very short cone, it is necessary to find a normal section, and experience has enabled us to determine this.

The angle of attack $\frac{\theta}{2}$, which seems to be the limit of the opening of the cone, is about 15 deg. For a larger inclination there is the risk of tearing the metal to be displaced.

For a diminution of thickness of sides $\frac{D-d}{2}$, the die which permits working under the best conditions is that where the connecting radius is equal to about seven and a half times the diminution of the thickness of sides.

This condition of efficiency of the die does not always occur in practise, especially where different passes must frequently be made on very different blanks. The following table gives the ideal values of the connecting radius r in relation to the pass of drawing:

Reduction of Thickness

of Walls $\frac{D-d}{2}$		$r = 7.5 \frac{D-d}{2}$	
Mm.	In.	Mm.	In.
2	0.08	15	0.59
4	0.16	30	1.18
6	0.24	45	1.77
8	0.32	60	2.36
10	0.39	75	2.95
12	0.47	90	3.54
14	0.55	105	4.13
16	0.63	120	4.72
18	0.71	135	5.32
20	0.79	150	5.91

The relation of engineering and management is to be discussed by Walter Rautenstrauch of the J. G. White Management Corporation, New York, at a meeting of the Bridgeport section of the American Society of Mechanical Engineers at the Stratfield Hotel, Bridgeport, Conn., on Oct. 20.

The Maine Central Railroad Co. has placed a \$500,000 equipment order with the Laconia Car Co., Laconia, N. H. The plants at Laconia will reopen at once and will be run on full time for several months.

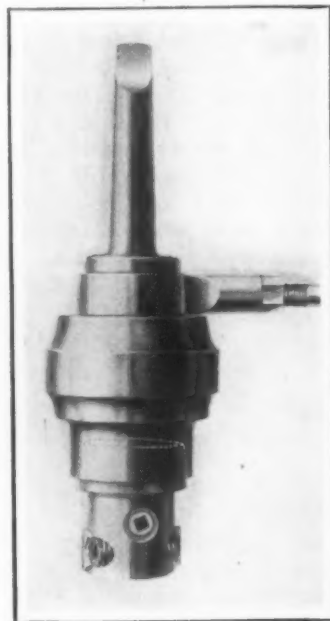
Exports of Metal Working Machinery

WASHINGTON, Oct. 10.—Exports of metal working machinery during August, 1921, were valued at \$931,563, according to the Bureau of Foreign and Domestic Commerce. The value of exports of lathes was \$51,569; of sharpening and grinding machines, \$61,711; of other machine tools, \$209,630, leaving a remainder of \$608,653 for the other types. Brazil was the largest buyer of lathes, shipments to the value of \$9,081 having been made to this country. England ranks second in this commodity, with purchases amounting to \$8,712, and Colombia third, taking \$5,983.

Canada led as to sharpening and grinding machines, the value of exports to that country being \$22,844; France was second, \$7,550, and Japan third, \$6,346. Under the classification of "other machine tools," among the leading countries of exportation were British India, \$40,358; France, \$32,119; Brazil, \$22,244, and Canada, \$21,233. Under the classification of all other, France took more than one-half of the entire total, exports to that country being valued at \$325,734. British India came next, the exports to that country being valued at \$76,325, and then followed England with \$37,399; Japan, \$36,787; Canada, \$23,987, and Hongkong, \$20,130.

Friction Tapping Device

A friction tapping device, known as the Jarvis, style FD, said to be capable of tapping holes in the toughest metal, with minimum breakage of taps, has been placed



The Dotted Lines Indicate Size of Friction Cone

on the market by the Geometric Tool Co., New Haven, Conn.

The outstanding feature is the cone friction drive, controlled by directing greater or less pressure on the spindle that runs the device. The dotted lines in the illustration indicate the size of the friction cone. Little pressure is needed to drive the tool and the chuck, which is of standard design, yields easily. Starting and stopping the tap while rotating is under free control. It is made in one size only, with a tapping range from 0 to 1/4 in.

The Harrisburg Bar Mill Co., Harrisburg, Pa., has been chartered under State laws to operate a plant on North Sixth Street, near the city limits, for the manufacture of iron and steel bars, etc. J. K. White, formerly general sales manager of the Harrisburg Pipe & Pipe Bending Co., is president, and A. L. Ensinger, also previously connected with the same company, is secretary.

Figuring the Charges for Foundry Irons

Iron Mixtures and How to Figure Them Chemically—Classification of Castings and Suggested Analyses

—BY Y. A. DYER*

IF the chemical analysis of a pig iron shows that it contains 92.60 units of iron, 3.85 units of carbon, 2.00 units of silicon, 0.05 unit of sulphur, 0.50 unit of phosphorus, and 1.00 unit of manganese, then it is equivalent to stating that 100 pounds of such an iron contains:

92.60 lb. iron	92.60 per cent
3.85 lb. carbon	3.85 per cent
2.00 lb. silicon	2.00 per cent
0.05 lb. sulphur	0.05 per cent
0.50 lb. phosphorus	0.50 per cent
1.00 lb. manganese	1.00 per cent
100.00 lb.	100.00 per cent

Therefore, in figuring mixtures of metal these points should be borne in mind from the fact that the elemental units in iron are figured on the percentage basis. Thus, if a 3,000-lb. charge of metal consists of pig iron 1,200 lb., scrap 1,200 lb. and steel 600 lb., then the charge percentages will be:

$$\frac{1200 \times 100}{3000} = 40.00 \text{ per cent pig iron,}$$

$$\frac{1200 \times 100}{3000} = 40.00 \text{ per cent scrap iron,}$$

$$\frac{600 \times 100}{3000} = 20.00 \text{ per cent steel scrap.}$$

$$100.00 \text{ per cent total charge.}$$

As the iron units are not taken into consideration in figuring analyses, only the carbon, silicon, sulphur, phosphorus and manganese are figured. The carbon is usually omitted, from the fact that any losses which may occur during remelt will be adjusted by absorption of carbon from the coke bed. The factors which tend to reduce the total carbon in a mixture are low tuyeres and the use of comparatively large quantities of low-carbon material—preferably steel scrap. Suppose the following mixture of metals be used:

	Si	S	P	Mn
10 per cent pig	2.00	0.05	0.50	1.00
40 per cent scrap	1.80	0.08	0.70	0.60
20 per cent steel	0.20	0.06	0.06	0.60
100 per cent				

Then the following element units, per 100 lb. of metal, will compose the average mixture:

$\frac{2.00 \times 40}{100} = 0.80$	$\frac{0.05 \times 40}{100} = 0.02$
$\frac{1.80 \times 40}{100} = 0.72$	$\frac{0.08 \times 40}{100} = 0.032$
$\frac{0.20 \times 20}{100} = 0.04$	$\frac{0.06 \times 20}{100} = 0.012$
1.56 units of silicon	0.064 unit of sulphur
$\frac{0.50 \times 40}{100} = 0.20$	$\frac{1.00 \times 40}{100} = 0.40$
$\frac{0.70 \times 40}{100} = 0.28$	$\frac{0.60 \times 40}{100} = 0.24$
$\frac{0.06 \times 20}{100} = 0.012$	$\frac{0.60 \times 20}{100} = 0.12$
0.492 unit of phosphorus	0.76 unit of manganese

Figuring Mixtures

Two essential points to be borne in mind in figuring and making mixtures are the analysis desired or necessary for a certain kind of casting, and the purchase by analysis of the proper kind of pig iron to be used as a base or controlling metal in the mixture.

*Birmingham, Ala.

To illustrate the process of figuring a mixture, suppose a pipe foundry desires metal of the following analysis: Silicon 2.25 per cent, sulphur 0.08 per cent, phosphorus 0.85 per cent, and manganese 0.65 per cent. Because of partial oxidation in the cupola, the mixture will require average silicon $(2.25 + 0.10) = 2.35$ per cent and average manganese $(0.65 + 0.10) = 0.75$ per cent. Thus, in a 4,000-lb. metal charge there will be needed:

$$\frac{2.35 \times 4000}{100} = 94.00 \text{ lb. silicon}$$

$$\frac{0.08 \times 4000}{100} = 3.20 \text{ lb. sulphur}$$

$$\frac{0.85 \times 4000}{100} = 34.00 \text{ lb. phosphorus}$$

$$\frac{0.75 \times 4000}{100} = 30.00 \text{ lb. manganese}$$

Then, assume that the pipe shop has the following materials on hand with which to make the mixture, and it is desired to use 25 per cent scrap and 40 per cent "4" foundry iron—what other grade of iron (silicon analysis) will be required to balance the mixture?

	Si	S	P	Mn
Foundry scrap	2.25	0.08	0.85	0.65
"4" foundry iron	1.75	0.06	0.85	0.60

Figuring the silicon content, the charges would be apportioned as follows:

Materials	Per Cent	Charge, Lb.	Silicon, Per Cent	Silicon, Lb.
Foundry scrap	25	1000	$2.25 \div 100$	22.50
"4" foundry iron	40	1600	$1.75 \div 100$	28.00
Needed iron	35	1400	$x \div 100$	43.50
	100	4000		94.00

$$x = \frac{43.50 \times 100}{1400} = 3.10 \text{ per cent silicon iron needed}$$

Other elements, sulphur, phosphorus and manganese, are figured on the same basis; deficiencies or excesses in elements being cared for by the use of desirable pig irons or alloys, as explained in the following examples:

Suppose the shop should not have available the necessary "2" soft iron, silicon 3.10 per cent, but had on hand the "4" foundry iron, silicon 1.75 per cent, and the melter desired to purchase a high silicon or silvery iron to use with 25 per cent scrap and 60 per cent "4" foundry iron—what percentage of silicon will be necessary to balance the mixture? The assumed charge (designated as "X iron") will be figured as follows:

Materials	Per Cent	Charge, Lb.	Silicon, Per Cent	Silicon, Lb.
Pig, Si. 1.75	60	2400	$1.75 \div 100$	42.00
Foundry scrap	25	1000	$2.25 \div 100$	22.50
X iron	15	600	$x \div 100$	29.50
	100	4000		94.00

$$x = \frac{29.50 \times 100}{600} = 4.92 \text{ per cent silicon iron needed}$$

Therefore, it will require a 600-lb. charge of iron with silicon 4.92 per cent to balance the silicon in the pipe mixture and care for the oxidation loss. Otherwise, 73.6 per cent (2935 lb.) of "4" foundry iron; 25 per cent (1000 lb.) foundry scrap, and 1.4 per cent (65 lb.) of 50 per cent ferrosilicon would answer the purpose.

If a foundry has on hand scrap iron containing 1.80 per cent silicon, 0.70 per cent phosphorus, and 0.70 per

cent manganese, and the melter desires to make castings with silicon 2.00 per cent, phosphorus 0.60 per cent, and manganese 0.80 per cent, with the use of 40 per cent scrap—what pig iron analysis will be necessary to balance the mixture? The mixture will require an average silicon content of $(2.00 + 0.20) = 2.20$ per cent; manganese $(0.80 + 0.16) = 0.96$ per cent, and phosphorus 0.60 per cent. Assume 2000-lb. charges are to be used—then there will be required $\left(\frac{2.20 \times 2000}{100}\right)$

$= 44$ lb. silicon; $\left(\frac{0.60 \times 2000}{100}\right) = 12$ lb. phosphorus, and $\left(\frac{0.96 \times 2000}{100}\right) = 19.20$ lb. manganese. The mixture is computed as follows:

Materials	Per Cent	Charge, Lb.	Silicon, Per Cent	Silicon, Lb.
Scrap	40	800	$\times 1.80 \div 100$	$= 14.40$
X iron	60	1200	$\times x \div 100$	$= 29.60$
	100	2000		44.00

$$x = \frac{29.60 \times 100}{1200} = 2.47 \text{ per cent silicon iron needed}$$

Materials	Per Cent	Charge, Lb.	Phosphorus, Per Cent	Phosphorus, Lb.
Scrap	40	800	$\times 0.70 \div 100$	$= 5.60$
X iron	60	1200	$\times x \div 100$	$= 6.40$
	100	2000		12.00

$$x = \frac{6.40 \times 100}{1200} = 0.53 \text{ per cent phosphorus iron needed}$$

Materials	Per Cent	Charge, Lb.	Manganese, Per Cent	Manganese, Lb.
Scrap	40	800	$\times 0.70 \div 100$	$= 5.60$
X iron	60	1200	$\times x \div 100$	$= 13.60$
	100	2000		19.20

$$x = \frac{13.60 \times 100}{1200} = 1.13 \text{ per cent manganese iron needed}$$

Therefore, it will require 1200 lb. for charge of an iron containing silicon 2.47 per cent, phosphorus 0.53 per cent and manganese 1.13 per cent, to balance the mixture and meet the required specifications.

Probably a more simple method for some foundrymen to figure mixtures would be on the basis of unit percentage of each element in the metal used, instead of total pounds of elements—which would be computed as follows for the mixture given above: 800 lb. of scrap iron to a total mixture of 2000 lb. is $(800 \div 2000) = 0.40$ per cent, and 1200 lb. of "X iron" to total mixture is $(1200 \div 2000) = 0.60$ per cent—hence unit percentages of metal mixture are stated as follows:

	Per Cent	Si	P	Mn
Scrap iron	0.40	1.80	0.70	0.70
X iron	0.60	2.47	0.53	1.13

Analysis of casting from above mixture will be computed as follows:

	Silicon	Phosphorus	Manganese
Scrap iron $(1.80 \times 0.40) = 0.72$	0.72	$(0.70 \times 0.40) = 0.28$	$(0.70 \times 0.40) = 0.28$
X iron $(2.47 \times 0.60) = 1.48$	1.48	$(0.53 \times 0.60) = 0.32$	$(1.13 \times 0.60) = 0.68$
	2.20	0.60	0.96
Losses and gains 0.20	0.00		0.16
Metal analysis.. 2.00	0.60		0.80

Both computing methods produce the same net results; the matter of choice lies with the foundryman to adopt the method which is simplest to his "turn of mind." Computation by both methods will serve as a check on the mixture, and prevent errors.

Varying mixtures may be melted in a cupola during a single heat period by the exercise of certain precautions. To avoid the possible mixing of the separate charges in the hearth of the cupola, it is advisable to separate iron charges by using blank coke charge of about 4 in. in depth. Such practice will hold the upper charge off until the excess coke burns to the melting zone, thus permitting the tapping of the metal in the meantime. By knowing the rate at which the cupola "drives" or works its charges through the melting zone,

and timing the operations accordingly, the problem may be solved accurately. The rate at which coke is consumed per minute per square foot of cupola area will solve the problem of burning away the blank coke charge.

Classification of Castings

The range of analyses for different castings is necessarily more or less varying; for that reason, in the following list of suggested analyses for various castings, the medium weight work will be considered the base. Heavier castings will admit of higher sulphur, higher manganese, lower silicon, lower combined and total carbon—hence steel scrap, low silicon scrap or low silicon pig iron may be used more freely in such mixtures. Lighter castings, as a rule, require lower sulphur, medium manganese, higher silicon, higher graphitic carbon to promote fluidity and minimize brittleness. The phosphorus in all cases should be kept as low as possible, consistent with fluidity and other necessary factors of safety. Steel scrap in quantities may be used to advantage, as it will materially lower total carbon, phosphorus and silicon and add some manganese. The author would strongly suggest steel mixtures where strength, toughness, homogeneity and smoothness are essential factors.

In addition to the analyses of special castings, the characteristics of which were explained in detail Sept. 8, under gray iron and chilled iron, the following general classification is given alphabetically as a convenient reference:

	Si	S	P	Mn	Total Carbon
Agricultural machinery:					
Heavy	2.00	0.09	0.60	0.80	3.35
Medium ...	2.30	0.07	0.65	0.70	3.45
Light	2.60	0.06	0.75	0.60	3.55
Very light. 2.80	0.05	0.85	0.50		3.60
Acid resisting castings:*					
Anvil blocks:*					
Armor (chilled):*					
Automobile castings:*					
Base plates:					
Heavy	1.30	0.10	0.50	0.70	3.15
Medium ...	1.80	0.08	0.60	0.60	3.35
Light	2.25	0.06	0.70	0.50	3.45
Balls—grinding and polishing:*					
Boiler castings—fronts, doors, headers:					
Heavy	2.00	0.08	0.50	0.75	3.40
Medium ...	2.25	0.06	0.60	0.50	3.45
Brake shoes:*					
Carwheels:*					
Columns: (Same as base plates.)					
Chilled castings:*					
Crusher jaws:*					
Cylinders—air and ammonia:					
Heavy	1.25	0.03	0.30	0.80	3.15
Medium ...	1.65	0.06	0.40	0.70	3.25
Light	2.00	0.05	0.50	0.60	3.40
Cylinders—steam and water:					
Heavy	1.25	0.08	0.30	1.00	3.15
Medium ...	1.50	0.06	0.40	0.80	3.25
Light	2.25	0.05	0.50	0.60	3.45
Dies:*					
Dynamo castings—frames and spiders:					
Heavy	2.00	0.06	0.60	0.60	3.40
Light	2.50	0.06	0.60	0.80	3.50
Electrical castings—magneto parts and armature cores:					
Medium ...	2.75	0.05	0.50	0.50	3.50
Light	3.00	0.05	0.60	0.50	3.60
Engine frames:					
Heavy	1.80	0.09	0.50	1.00	3.35
Medium ...	2.25	0.07	0.60	0.60	3.45
Enamelware, bathtubs, sinks:					
Heavy	2.25	0.03	0.80	0.50	3.45
Light	2.50	0.06	0.80	0.50	3.50
Flywheels:					
Heavy	1.25	0.09	0.40	0.75	3.15
Medium ...	1.75	0.06	0.50	0.65	3.25
Light	2.25	0.05	0.60	0.50	3.40
Friction clutches:					
Medium ...	2.25	0.10	0.60	0.75	3.45
Light	2.50	0.08	0.70	0.50	3.50
Gears and pinions:					
Heavy	1.75	0.09	0.50	1.00	3.30
Medium ...	2.25	0.08	0.60	0.70	3.45
Light	2.50	0.06	0.70	0.60	3.50
Grate bars:					
	1.50-2.25	0.05-0.08	0.30-0.50	0.50-0.60	3.40

*See THE IRON AGE, Sept. 8, pages 595-8.

	Si	S	P	Mn	Total Carbon
Gun iron:*					
Hollow-ware:	2.25-2.50	0.06-0.08	0.60-0.80	0.50-0.60	3.50
Heat resistant—grates, furnaces, etc.:					
Heavy	1.75	0.08	0.30	0.90	3.30
Medium	2.00	0.06	0.40	0.70	3.40
Light	2.25	0.06	0.50	0.60	3.45
Ingot molds:*					
Machinery castings—general:					
Heavy	1.50	0.10	0.50	1.00	3.20
Medium	2.00	0.08	0.60	0.70	3.40
Light	2.50	0.06	0.70	0.60	3.50
Molds—permanent:	1.50	0.08-0.10	0.40-0.50	0.75	3.25
Molds—glass:	2.50	0.05	0.25	0.60	3.35
Municipal castings—manholes, meter boxes, etc.:	1.75-2.00	0.08-0.10	0.60	0.50	3.35
Ornamental castings—and white-ware:					
Medium ...	2.25	0.08	0.80	0.70	3.45
Light	2.50	0.06	1.00	0.60	3.50
Thin	2.75	0.05	1.25	0.50	3.55
Pipe and fittings—soil:	1.80-2.25	0.08-0.12	0.80-0.90	0.40-0.50	3.40
Piano plates:	2.15	0.05	0.45	0.75	3.35
Plow points:*					
Pipe—water and gas:					
Heavy	1.75	0.09	0.80	0.70	3.30
Medium ...	2.25	0.06	0.85	0.60	3.45
Plow points:*					
Piston rings:*					
Pistons:*					
Projectiles:*					
Pulleys:					
Heavy	1.80	0.08	0.50	0.70	3.30
Medium ...	2.00	0.06	0.60	0.60	3.40
Light	2.50	0.05	0.75	0.50	3.50
Propeller blades:*					
Rolls—chilled:*					
Railroad castings:					
Heavy	1.50	0.09	0.60	0.60	3.20
Light	2.00	0.07	0.70	0.50	3.40
Sewing machine castings:	2.75-3.00	0.06-0.08	0.70	0.55	3.50
Stove plate:					
Medium ...	2.25	0.08	0.80	0.60	3.45
Light	2.50	0.06	0.90	0.50	3.50
Typewriter castings: (Same as sewing machine.)					
Valves:					
Heavy	1.50	0.08	0.35	1.00	3.20
Medium ...	1.75	0.07	0.40	0.80	3.30
Light	2.25	0.06	0.50	0.70	3.45
Welding rods:*					
White iron—sash weights, etc:	0.50-0.75	0.15-0.20	0.80	0.20-0.30	2.80-3.00

*See THE IRON AGE, Sept. 8, pages 585-8.

Care of the Eyes in Industry

Eye accidents are revealed as a chief source of avoidable national waste in a report of the Committee on Elimination of Waste in Industry of the American Engineering Council, following an investigation in many States, started by Herbert Hoover.

The total number of industrial blind in the United States is put at 15,000, or 13.5 per cent of the total blind population. The eye is involved in 10.6 per cent of all permanently disabling accidents.

Present protective methods applied in large plants have greatly reduced the number of injuries. The use of goggles is one of the chief protective devices. At the American Car & Foundry Co.'s plants there has been a reduction of more than 75 per cent through the use of goggles and the percentage of reduction would be much higher if the men would wear goggles more conscientiously. Experience has proved the falsity of the theory that the wearing of goggles by industrial workers only jeopardizes sight the more, on account of the liability of injury to the eyes from the broken glass of the goggles.

Not an injury to the eyes from broken glass has been recorded since goggles were introduced into the shops of the New York Central Railroad. All employees of the Union Pacific Railroad Co. are now required to wear goggles on eye-dangerous work.

The Bethlehem Steel Co. management is very rigid

in demanding that protection be complete, supplying goggles according to a code.

Striking reduction in eye accidents is shown by the American Locomotive Co. The number of accidents requiring medical attention in the company's plants was 52 in 1915, while during 1910-13 it was 448. In 1915 only two eyes were lost, while during 1910-13 the loss was 10.5. The number of injuries per 1000 full-time men per year was 15.7 in 1915, while in the 1910-13 period it was 38.9. In the American Steel Foundries the number of eye accidents has been reduced 85 per cent.

That correction of sub-standard vision produces an increase in return that will pay for its cost is the conclusion of the management in plants where several years of trial has provided a basis for judgment.

Excess eye fatigue results in conditions which must produce a time labor loss from reduction in quantity and quality production. Sub-standard vision was found to be of great frequency. An examination of more than 10,000 employees in factories and commercial houses found 53 per cent with uncorrected faulty vision. Of 675 employees in a typewriter company, 58 per cent were found to be in need of correction by glasses. Of the rejections in the army, 21.7 per cent were because of eye trouble.

One estimate placed the production loss due to faulty conditions in this country as above the entire cost of illumination. In 446 plants investigated only 8.7 per cent were found to be in excellent condition, the other ratings being: Good, 32 per cent; fair, 29.1 per cent; poor, 18.8 per cent; very poor, 3.5 per cent; partly good, partly poor, 7.8 per cent.

Improved lighting systems have increased output 2 per cent in steel plants and as much as 10 per cent in shoe factories where work is more exacting. The cost for providing adequate illumination for the entire industry of the country would amount to 0.5 per cent to 1 per cent of wages. The cost per capita of correcting vision, instituting and carrying out measures of protection against hazards and bringing the lighting up to good standards, is definitely greater in the small plant than in those employing 2000 workers or more—and the small plants are in the large majority.

These smaller plants are therefore less ready to take up any of these measures unless the early returns of a dividend can be clearly shown. Reports of more study, the example of the earlier ones to take the steps, must be brought before them constantly so that efforts to check preventable loss along these lines may become more nearly universal.

The committee is composed of J. Parke Channing, chairman; L. W. Wallace, vice-chairman; L. P. Alford, George D. Babcock, William R. Basset, F. G. Curn, Morris L. Cooke, Harrington Emerson, Ira N. Hollis, Edward Eyre Hunt, C. E. Knoepfel, Robert Linton, Fred J. Miller, H. V. R. Scheel, Sanford E. Thompson, John H. Williams and Robert B. Wolf. Headquarters are at 29 West Thirty-ninth Street, New York.

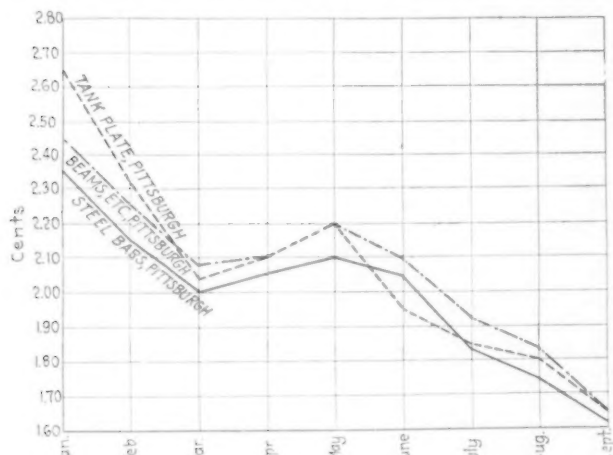
Makers of Electric Steel Castings Meet

The operating officials of several companies specializing in the manufacture of small electric steel castings recently held a four-day meeting at Wernersville, Pa. These companies for more than a year have been closely co-operating along technical lines through R. A. Bull, their research director, whose time is exclusively given to the operating problems of these companies. The foundries co-operating in the work are those owned by the Electric Steel Co., Chicago; the Fort Pitt Steel Casting Co., McKeesport, Pa.; the Lebanon Steel Foundry, Lebanon, Pa.; Michigan Steel Casting Co., Detroit, and the Sivyer Steel Casting Co., Milwaukee. Frequent meetings of the representatives of these companies are held. At the Wernersville meeting uniform inspection standards, which the group had voluntarily put in force, were revised as the result of a year's experience in their application. Those present at the meeting report entire satisfaction on the part of all with the results of the first year's co-operative work in attacking the problems which face steel foundrymen.

TREND OF PRICES

Decline About \$10 Per Ton Since Jan. 1—Upward Turn of Some Products Recently

In the third quarter of this year, pig iron and steel prices have dropped to the lowest points since 1915-1916 and within the same period some commodities, including pig iron, sheets and wire, have shown the first de-



This Chart Illustrates the Decline in Principal Steel Products During the Nine Months of 1921 Ending Sept. 30

cided upward turn since the price decline began in the fall of 1920.

Although pig iron prices have shown an upward tendency in nearly all markets within the past few

iron in the Valley dropped from \$30 to a September average of \$19.12, or \$10.88 and Bessemer iron at Pittsburgh declined \$12, from \$33.96 in January to \$21.96 in September.

The decline in steel prices in the third quarter was greater than during the first half. For example, the January average for steel bars was 2.35c., Pittsburgh, and the June average, 2.05c., a drop of \$6 a net ton. From the end of June to the first of October, there was a drop of about \$9 a net ton. Steel plates have dropped \$21 a ton and structural shapes \$17 a ton.

Accompanying charts and monthly averages of principal products, compiled from THE IRON AGE quotations, illustrate the steady decline which has taken place within the nine months' period.

Recent British Developments in Stainless Iron

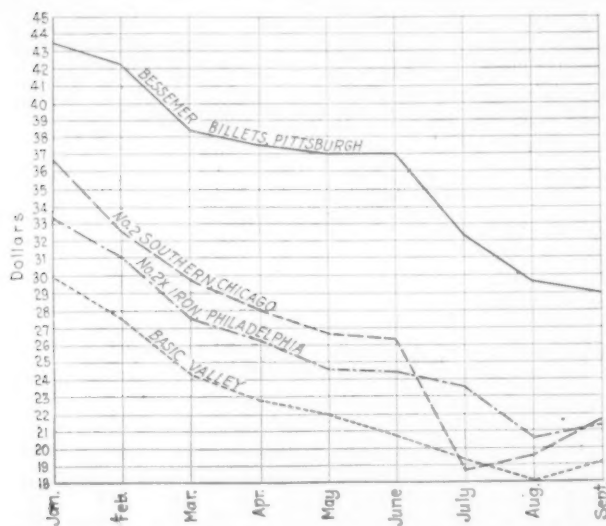
The extent to which stainless steel has revolutionized the Sheffield cutlery trade is well known, but it is not so generally appreciated, the *London Times Trade Supplement* points out, that stainless iron is of equal importance. Both materials, says the *Times*, were discovered seven or eight years ago. Stainless steel was first manufactured, and soon after it was found that stainless iron could be produced by much the same process, with the exception that a smaller quantity of carbon-free ferrochrome was required.

Stainless iron has been largely used for the production of golf clubs; it has attracted the attention of makers of stove grates and is being used for kitchen ranges, grates, and fenders. An important and useful direction in which the material has been applied is in the fitting of motor cars; it is supplied in sheets for making hoods, and there is in contemplation its greater use for bodies, and since it does not tarnish, for replac-

Prices of Leading Products for Nine Months of 1921

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.
No. 2X pig iron, Philadelphia.....	\$33.34	\$31.09	\$27.59	\$26.26	\$25.71	\$25.50	\$23.55	\$20.64	\$21.22
No. 2 Southern, Cincinnati.....	36.75	32.65	29.80	28.00	26.70	26.37	24.75	23.50	23.50
No. 2 Chicago.....	31.50	29.00	25.60	24.00	22.80	20.75	18.87	19.55	21.75
Basic, Valley furnace.....	30.00	27.50	24.25	22.88	22.00	20.75	19.37	18.00	19.12
Bessemer iron, Pittsburgh.....	33.96	31.46	28.16	26.96	25.96	24.71	22.83	21.96	21.96
Bessemer billets, Pittsburgh.....	43.50	42.25	38.40	37.50	37.00	37.00	32.25	29.75	29.00
Wire rods, Pittsburgh.....	57.00	54.50	52.00	49.00	48.00	48.00	42.75	42.00	39.50
Steel bars, Pittsburgh.....	2.35c.	2.15c.	2.00c.	2.05c.	2.10c.	2.05c.	1.83c.	1.75c.	1.62c.
Tank plates, Pittsburgh.....	2.65c.	2.33c.	2.04c.	2.10c.	2.20c.	1.95c.	1.85c.	1.80c.	1.64c.
Beams, etc., Pittsburgh.....	2.45c.	2.26c.	2.08c.	2.10c.	2.20c.	2.10c.	1.92c.	1.83c.	1.64c.
Wire nails, Pittsburgh (per 100-lb. keg)...	\$3.25	\$3.21	\$3.02	\$3.13	\$3.05	\$3.00	\$2.81	\$2.75	\$2.86

months, the net decline on all grades averages more than \$10 a ton since the first of the year. No. 2 X iron, delivered at Philadelphia, declined from \$33.34, its January average, to \$21.22, its September average,



The Course of Prices During the First Nine Months of the Year on Bessemer Billets and Pig Iron Is Shown in This Chart

a drop of \$12.12. No. 2 foundry, delivered at Cincinnati, declined from its January average of \$36.75 to a September average of \$23.50, a net drop of \$13.25. No. 2 foundry at Chicago declined \$9.75 per ton, basic

ing nickel-plated parts. It is made up into a wide variety of kitchen utensils and is used for shop signs and door plates. One British firm is producing the material in wire form, to be made up into door mats, and it is also being used for spring mattresses.

Another important development in contemplation is the use of stainless iron for the furnishing of railway carriages, engines, and rolling stock generally. The proposal is that it should replace brass for door handles, brackets, and many other fittings.

Stockholders of the Commercial Shearing & Stamping Co., Youngstown, Ohio, have authorized an increase in the capital stock from \$350,000 common to \$1,500,000, consisting of \$400,000 preferred and \$750,000 common. Proceeds will be devoted to enlarging the company's plant and will also be used as working capital. A plant addition to cost between \$125,000 and \$150,000, exclusive of equipment, is to be built and is to be completed by spring. Of the increased capital, only the preferred will be marketed at this time. Robert Carnick is president of the company.

The B. Greening Wire Co., Hamilton, Ont., commenced Monday, September 26, to operate its plant at full time, whereas previously only three days a week had been worked by the 350 employees of the company. Increased orders made the full time shift possible, and the company expects to keep going at full time from now on, although there is no assurance that this can be done.

Crane Operating Costs at Blast Furnaces

Locomotive and Ore Bridge Cranes Shown to Save Much Money, Compared with Hand Methods Formerly in Vogue—Analyses of Costs

— BY GEORGE L. COLLORD* —

TWO of our three blast furnaces at Sharpsville, Pa., are equipped with Brownhoist equipment, consisting of all the machinery necessary for filling the blast furnaces and handling the finished pig iron. Practically all the machinery was manufactured and installed by the Brown Hoisting Machinery Co., and the system has proved itself a great labor saving device.

Consisting primarily of a Brownhoist ore bridge equipped with a 5-ton grab bucket, the span covered is 170 ft. 9 in., and the bridge is arranged to travel back and forth on a stretch of track 890 ft. long. When the yard which this bridge covers is filled to capacity, it has a cross sectional area of 6480 sq. ft. This is equivalent to a capacity of 432 tons per lineal foot; and since the yard is 890 ft. long, the total capacity is 384,480 tons.

Railroad cars come in along one side of this yard on an elevated trestle, from which they dump ore, coke

and limestone into bins beneath. One track runs over the ore and limestone bins and another over the coke bins. A third track is overhung above the storage pile, and is used for delivering ore and limestone into the stock pile, from which it can be handled by the grab bucket on the bridge.

gage with mechanism for opening the bin gate, after which the gate is operated by a motor on the larry car. The larry hoppers are set, by the official in charge, to receive a certain weight of ore, coke and limestone. After receiving this load, the larry runs to a point opposite one of the furnaces, and dumps into a skip car of 110 cu. ft. capacity. This car is hoisted by a 100-hp. engine, and upon reaching the blast furnace top its load is discharged into the receiving hopper.

The entire equipment cost around \$300,000, when it was installed, in 1909. Since it is in good condition after twelve years' operation, we are certainly safe in estimating its minimum life at fifteen years.

Repairs to bins are not heavy, considering the amount of material handled and passed through. This does not exceed \$2,500 a year. The hoisting apparatus and three larry cars (including one spare) require \$1,000 worth of repairs a year per furnace. Repairs



Though This Ore Bridge Is in Operation Only 50 Per Cent of the Time, It Has Been Estimated That It Saves More Than \$73,000 Per Year, as Compared with the Cost Under the Previous Method of Handling the Same Material Manually

and limestone into bins beneath. One track runs over the ore and limestone bins and another over the coke bins. A third track is overhung above the storage pile, and is used for delivering ore and limestone into the stock pile, from which it can be handled by the grab bucket on the bridge.

If the bins become empty, and there are no full cars available for filling them, the grab bucket picks up a load, travels across the bridge and deposits it in the bin. While the bridge is able to dump into any one of the bins, it is usually inadvisable to move so large a mass as this bridge any great distance, so a transfer car of 30 tons capacity runs back and forth along the track above the bins, thus saving the bridge a great deal of travel.

Running on tracks below the bins are two electrically operated larry cars of 75 cu. ft. capacity. Each car is designed with a universal joint to en-

and maintenance on the bridge do not exceed \$2,500 a year. Including repairs to minor equipment, this makes the total annual repair cost about \$8,500.

The principal motors which consume large quantities of power are the 200-hp. bucket hoisting motor, which runs approximately 50 per cent of the time; and the 50-hp. motor which drives the cab back and forth across the bridge, and which operates approximately one-third of the time. The bridge proper operates only 12 hr. out of the 24, but the other equipment operates 24 hr.

Each larry car has a 15-hp. motor, which is running about 18 hr. out of the 24. The skip hoists require 100 hp. and operate about 9 hr. a day. The total annual power consumption is approximately 587,650 kw. hr., which, at 1c. per kw. hr., makes \$5,876.50 a year. Our power rate is low, because of the fact that we use blast furnace gas for generating.

The bridge requires one operator, who works 12 hr. a day at 50c. an hr., and an oiler at 40c. an hr.

*General manager of operation, Shenango Furnace Co., Oliver Building, Pittsburgh.

Each larry car requires an operator, and as there are two turns per 24 hr., this means a total of four operators at 50c. an hr. Four men are also required to run the skip hoists. The transfer car is not used a great deal, so the charge for labor and power does not exceed \$1,500 per year.

Our total annual labor costs are \$18,834. The total cost for maintenance and repair is \$8,500 a year. Adding average yearly interest, taxes and insurance, brings the total annual operating cost to \$73,410.50.

One furnace averages 550 tons per day, the other 400 tons per day, making a total of 346,750 tons per year. This makes the cost per ton 21.17 cents. This figure is low compared with the cost when this work was done by hand.

With the hand system the materials were dumped from a trestle and loaded into buggies by hand. Each man ran his loaded buggy over a scale and then up into an elevator to a platform at the top of the furnace, where the load was dumped by hand. This old method required a number of men, who are expensive, hard to handle and sometimes difficult to get.

We formerly employed 21 stock men per turn on each furnace. Since there are two furnaces and two turns every 24 hours, this meant 84 men for the two furnaces now fed and manipulated by machinery. At 40c. an hr., which is the present scale, this is a labor item of \$147,168 per year.

Deducting the annual cost of operating the Brownhoist bridge, bins and scale cars, gives us a net annual saving of \$73,757.50, or a net saving of 21.27c. per ton of pig iron produced. Therefore this system has cut our cost to practically one-half of what it formerly was.

The mechanical equipment has the additional advantage of operating so much more rapidly that it increases production, and one furnace which used to produce 300 tons per day when fed by hand, now pro-

Annual Cost of Operation—Ore Bridge, Bins and Scale Cars	
Depreciation, \$300,000 (over 15 yr.).....	\$20,000.00
Average yearly interest at 7 per cent,	
$\frac{16}{15} \times \frac{\$300,000 \times 0.07}{2}$	11,200.00
Repairs and maintenance, estimated.....	8,500.00
Power: Bridge motors, larry cars, transfer car and skip hoists, total 587,650 kw. hr. at 1c. . .	5,876.50
Labor:	
1 ore bridge operator, 12 (hr.) \times 50c. \times 365 (days).....	\$2,190.00
1 bridge roller, 12 (hr.) \times 40c. \times 365 (days)	1,752.00
4 larry operators, 12 (hr.) \times 42½c. \times 365 (days).....	7,446.00
4 skip hoist operators, 12 (hr.) \times 42½c. \times 365 (days).....	7,446.00
Total annual labor.....	18,834.00
Taxes and insurance at 3 per cent.....	9,000.00
Total annual operating cost.....	\$73,410.50
Tons of pig iron produced, (550 + 400) \times 365 (days)	346,750 tons
Cost per ton, $\frac{\$73,410.50}{346,750}$	\$0.2117

Cost Comparison—Hand Labor for Charging Furnaces	
Hand labor per furnace per turn = 21 men.	
Number of furnaces, 2; number of turns, 2.	
Total hand labor—21 (men) \times 2 \times 2 = 84 (men) \times 12 (hr.) \times 40c. \times 365 (days)....	\$147,168.00
Total operating cost of Brownhoist bridge.....	73,410.50
Net annual saving.....	\$73,757.50
Net saving per ton of pig iron produced.....	\$0.2127

duces 550 tons per day. Naturally, other factors have influenced this increase, but the fact remains that our two furnaces now produce as much as the three hand operated furnaces formerly produced.

Locomotive Cranes in Blast Furnace Work

There have been times when our locomotive cranes have saved us from shutting down our furnaces for lack of labor. At such times a locomotive crane has been worth almost any amount of money, but even in its daily work a crane is a profitable investment in work such as ours.

In 1909 we purchased for our plant at Sharpsville a 15-ton Brownhoist locomotive crane. Its work proved so satisfactory that we bought a 40-ton crane

of the same make in 1913. Our locomotive cranes were bought for two reasons:—first, to cut down operating costs; second, to assure us a continual supply of raw material, regardless of labor conditions. In both respects they have proved satisfactory.

Using a magnet, the 15-ton crane loads and unloads pig iron from cars to storage, and adjusts the car weights. In normal times it handles 25,000 tons of pig iron a year, half of this amount being loaded into cars and half unloaded from cars. Our other crane handles an equal tonnage. We often equip the crane with a ¾-yd. grab bucket for handling coal, sand, gravel and fire clay.

These two cranes together average five 40-ton cars of coal per week, unloading from the cars into the boiler house. Each month they handle ten 40-ton cars

Annual Cost of Operation—15-Ton Locomotive Cranes	
Depreciation, \$8,500 (over 15 yr.).....	\$566.67
Average yearly interest at 7 per cent,	
$\frac{16}{15} \times \frac{\$8,500 \times 0.07}{2}$	317.33
Repairs and maintenance, estimated.....	5,000.00
Coal, $\frac{3}{4}$ (ton per day) \times 180 (days) \times \$4 per ton.....	\$540.00
Labor: Operator, 180 (days) \times 12 (hr.) \times 48c.....	1,036.80
Fireman, 180 (days) \times 12 (hr.) \times 37c.	799.20
Total annual operating cost.....	\$8,260.00
Tons handled: Pig iron.... 50,000 tons	
Coal 10,400 tons	
Sand, etc.... 4,800 tons	
65,200 tons \times ½ = 32,600	
Average cost per ton.....	\$0.2534

Calculation of Saving	
Labor handling pig iron:	
12 (men) \times 12 (hr.) \times 365 (days) \times 37c.	\$19,447.20
Cost of spotting cars:	
10 (cars per day) \times 365 (days) \times \$2 \times ½	3,650.00
Total former cost (excluding coal and sand)	\$23,097.20
Cost of operating crane.....	8,260.00
Net annual saving.....	\$14,837.20

of sand, in addition to small quantities of fire clay and gravel for use in making concrete.

They have also solved a very expensive and troublesome problem by their ability to spot cars. The railroad will spot a car once, but if any re-spotting is required we have to pay for it. Since the charge is \$2 a car, and we re-spot an average of 10 cars a day, our former cost for this work was \$7,300 a year.

Typical operating costs are best shown by the 15-ton crane, which has been longest in regular service. This crane is doing one-half the work at our plant, though it averages only 180 full working days per year. The two cranes are necessary in order to take care of peak loads and insure uniform production.

Depreciation, repairs and maintenance are based upon our crane expense. The 15-ton crane consumes approximately ¾ ton of coal per day, at \$4 a ton, making the annual power cost \$540. The labor required includes an operator at 48c. an hr. and a fireman at 37c., making the total labor cost \$1,836. The charge for maintenance and repairs is \$5,000 a year. This, with the figures for depreciation and interest, gives a total annual operating cost of \$8,260.

Two cranes handle 50,000 tons of pig iron, 10,400 tons of coal and 4800 tons of sand, or a total of 65,200 tons a year. Crediting half of this, or 32,600 tons, to the 15-ton crane, makes its average cost per ton 25.34c. Doing the same work formerly cost us \$19,447.20 a year for handling pig iron, and \$3,650 a year for spotting cars. This gives us a saving of \$14,837.20 a year, or an annual return of 175 per cent on our investment.

Declaring that 33,000 breadwinners are out of work in Rhode Island, Gov. San Souci has declared his intention of calling a State Unemployment Conference to alleviate conditions, upon the termination of the National Unemployment Conference at Washington. The Governor accredited the overseer of the poor of Providence with the statement that such conditions as now exist in that city are unparalleled within his official recollection.

Making Dump Bodies for Motor Trucks

Specialized Factory Unit of Van Dorn Iron Works Co. Is Arranged for Convenience and Economy in Handling Materials—Shipping Room Abolished

ONE development of the automotive industry that has come with the increase in the use of motor trucks for heavy work is the demand for truck bodies of special design, which are now being made in numerous types for handling various kinds of material. Specializing on this line of equipment, the Van Dorn Iron Works Co., Cleveland, recently erected a factory building for the manufacture of truck and tractor equipment. This highly specialized factory unit is designed for convenience and economy in handling the bulky and heavy dump truck bodies, during the manufacturing and assembling operations.

Truck bodies in ten standard types and in various

hoists with which the dump bodies are equipped. On the third floor, frames are manufactured for the White Company's line of trucks. All floors are provided with 2-ton floor-operated electric traveling cranes, used in handling material and bodies in process of manufacture.

Building columns divide the two lower floors into two bays on each side of the well, the four bays on each floor being served by cranes. On the third floor the center building columns are omitted, making a bay 40 ft. wide on each side of the well, and allowing ample room for handling long truck frames with the overhead crane. The wide span permits moving the frames about the floor in the position in which they



Bodies Are Built on the Second Floor, at Left, and Elevating Devices at Right. The bodies are shipped from the lower floor on their own trucks, as shown near the end, when those trucks are available. Otherwise, they are taken to the yard by a tractor and there loaded into railroad cars by a locomotive crane

sizes, as well as many special types, are made in the plant, and also mechanical dump hoists for them. The bodies are built of steel plates, without bending, forming or pressing of the metal that forms the bottom, side and end members. The plate sections are sheared to size, fabricated and assembled, with standard structural channels, I-beams and angles riveted together.

This department occupies a building of brick and steel construction three stories high, 264 x 120 ft., with floors of creosoted wood blocks. The predominating feature of the plant is the center court, or well, for handling raw material and the finished product from one floor to another. Over the well is a cage-operated 5-ton electric traveling crane which serves the three floors and does away with the necessity of a material elevator. The monitor over the well has continuous glass in the roof and side walls. This, with continuous window sections in the side walls of the building, provides unusually good light throughout the plant.

On both sides of the well the first floor is used for shearing, forming and bending materials required in the construction of bodies and frames. One side of the second floor is used for assembling bodies and the other side for assembling and testing the mechanical

happen to be, without necessity for swinging them into a lengthwise position.

The pit construction provides an open area 30 ft. 6 in. wide and 165 ft. long on the third floor and 20 ft. 6 in. wide and 125 ft. long on the second floor. The second floor, extending out into the pit from the building columns 6½ ft. on each side, forms a balcony around the pit, which facilitates handling material between the second and the first floor, with the crane above the pit.

Some of the material taken to the third floor is handled over the sides of the pit, being raised to the proper height by the crane, and then swung out to the floor by guide ropes. But much of the heavy handling, including the lowering of finished bodies to the first floor, is done at the ends of the building. As the pit is 20 ft. longer at each end of the third floor than at the second, an open area of that extent is provided at each end of the second floor under the crane runway for handling bodies. As the crane runs the entire length of the building, ample room is provided for handling material under the runway at both ends of the third floor.

Both the balcony and the third floor are inclosed

along the sides of the well by pipe rail, along the lower part of which, for a distance of 18 in. from the floor, is a fine mesh wire screen, to prevent small pieces of metal from falling to the lower floors.

For trucks built in Cleveland, the bodies are mounted in the pit on the first floor. The truck chassis is run onto this floor under its own power, and the body and body-operating hoist are lowered onto it from the floor above, by the crane. Bodies for rail shipment, lowered onto trucks, are hauled out into the yard by a gasoline tractor of the Towmotor type. A locomotive crane loads them onto cars. The same tractor brings raw stock into the body department. This plan of moving the finished product eliminates a shipping room.

For handling work in progress in the manufacturing bays, there are three electric traveling cranes with 40-ft. 3-in. span on the third floor, and ten cranes with 18-ft. 4-in. span on the first and second floors. These



Another View of the Pit, Showing How Material Is Handled from Each Floor. The extent of monitor lighting is apparent

are all 2-ton floor-operated 3-motor double girder cranes. Cranes were selected to get the maximum lift with a limited amount of head room. The distance from the floor to the top of the crane runway is 12 ft., and from the runway to the roof truss, 3 ft. The 5-ton cage-operated 3-motor crane over the well has a 31-ft. span and a 52-ft. lift; the hook travels to within 16 in. of the runway rail at each end. The cranes, supplied by the Barber-Foster Engineering Co., Cleveland, are equipped with Crocker-Wheeler motors, Electric Controller & Mfg. Co. controllers, and with Hyatt roller bearings throughout.

One feature of the manufacturing operations is the arc welding of seams in making water-tight bodies, this method having been substituted for calking in making a water-tight joint. The arc welding process is also used for welding the gusset plates that reinforce the corners and edges of bodies. Oxy-acetylene equipment is used largely for cutting off work.

The Southern Coal & Iron Corporation has purchased the properties, plants, machinery and equipment of the Rittenhouse Iron Co., Rittenhouse Gap, Pa. The plant will be put into operation at once for shipping iron concentrates to the furnaces in that district, including the Bethlehem Steel Co. and the Eastern Steel Co. The properties contain 700,000 tons of blocked out iron, with 5,000,000 tons of potential ore, estimated to contain 56 per cent iron.

Increase in Employment in Steel Industry

WASHINGTON, Oct. 11.—An increase of 6226 employees, amounting to 2.2 per cent, was made by the iron and steel industry in September, when compared with August, according to the industrial survey of the Employment Service. The increase in the number of workmen in the iron and steel industry was greater than that of any of the other industries which showed a gain.

The net increase in employment in September in the 1428 firms reporting was 18,050 over August, a gain of 1.2 per cent. Of the 65 cities reporting, 38 reflected increases and 26 showed decreases. Most of the more important iron and steel centers showed increases, among them being Pittsburgh, 8 per cent; Birmingham, Ala., 4.4 per cent; Cleveland, 4 per cent; Youngstown, Ohio, 7.9 per cent; Buffalo, 7.3 per cent; Johnstown, Pa., 6.7 per cent; Chicago, 1.15 per cent, and Philadelphia, 0.007 per cent. A decrease of 2.2 per cent was reported by New York.

A gain of 1699 employees, or 2.6 per cent, was made by railroad repair shops and 854 employees, or 1.1 per cent, by metal and metal production, other than iron and steel.

Director General Francis I. Jones, pointing out that the continued increase in employment confirms the indications observed in August that the industrial pendulum is definitely on the upward trend, says that these favorable trends should not obstruct the fact that within the next 30 days thousands of agricultural seasonal workers will return to the industrial centers and join the multitude of unemployed, unless buffer employment is furnished them until they can be absorbed in their previous occupations.

The Graphitic Corrosion of Cast Iron.

As a "suggested research," the Engineering Foundation, 29 West Thirty-ninth Street, New York, has issued a statement emphasizing the desirability of investigating the so-called graphitic corrosion of cast iron. It has been known for years, says the statement, that some iron castings, when long in contact with seawater, were so changed that they could readily be cut with a knife. Recently similar change has been observed in castings buried in soils impregnated with certain salts, especially in northern central United States and adjacent portions of Canada. Damage and danger result. Apparently this change has often been attributed to the action of stray electric currents from railways. Possibly the two kinds of corrosion have proceeded simultaneously in some places, and this fact has led to failure to separate the two causes.

A prominent engineer, who has studied the problem for several years with the assistance of experts, states that there is but little real knowledge concerning this phenomenon and has recently suggested a thorough research by Engineering Foundation because of the widespread interest in the problem to owners of water, gas and oil pipes, sea-going vessels, power plants and other industrial and engineering structures having iron objects exposed to salt or brackish water, or buried in impregnated soils. Lead is reported to have been similarly affected in some places. Engineering Foundation is making a preliminary examination of the subject, but "needs a special fund of several thousand dollars to prosecute the research effectively."

A. E. Blake, Pittsburgh district manager, United Gas Improvement Contracting Co., Philadelphia, will be the speaker at the regular monthly meeting of the Pittsburgh Foundrymen's Association at the General Forbes Hotel, Monday evening, Oct. 17. His subject will be "Blue Gas, Coal Gas and Producer Gas for Replacing Natural Gas in Foundries and Steel Works."

The LaBelle Iron Works, on Oct. 3, started up 71 of the 94 coke ovens at East Steubenville. No. 2 furnace at Steubenville was blown in Oct. 6, and it was officially announced that the Top furnace of the Wheeling Steel Corporation will be blown in Oct. 12.

Progress in Iron and Steel Metallurgy

Electrolytic Iron Malleable Castings
and Metallographic Research Discussed
by Mining and Metallurgical Engineers

THE meeting of the New York section of the American Institute of Metallurgical Engineers, held at the Machinery Club in New York, Wednesday evening, Oct. 5, made an unusual contribution to current literature of iron and steel. The topic of the evening was "Problems and Progress of Iron and Steel Metallurgy." Papers were presented by Prof. J. Cavalier, professor of metallurgy, University of Toulouse, France; Bradley Stoughton, consulting metallurgist, New York; Prof. William Campbell, Columbia University, and

advisory metallurgist of the Navy Yard, New York, and John Vipond Davies, of Jacobs & Davies, New York, who is president of the United Engineering Society.

Professor Cavalier reviewed the war effort of the French steel industry and summarized the work of reconstruction in France, devoting the latter half of his paper to recent advances in steel testing and in operating methods at French works. Quite full synopses of the four papers are given below:

Improvements in the Metallurgy of Iron and Steel

BY BRADLEY STOUGHTON*

THE most important recent development of the world's iron ore resources is the opening up for mining and exportation of the Itabira iron ores of Brazil. According to published reports in the *Journal* of the Iron and Steel Institute (London), Brazil has more than two billion tons of iron ore higher than 50 per cent iron and at least one billion tons better than 60 per cent iron. The Itabira ore deposit contains several hundred million tons, approximately 69 per cent iron, less than 0.01 per cent phosphorus, less than 0.02 per cent sulphur and less than one per cent silicon.

Blast Furnaces

The most important progress in respect to blast furnace design and operation is the use of a hearth 20 ft. 9 in. in diameter. With a bosh of only 22 ft. it will be evident how steep the bosh walls are in this design, which was originally decided upon because one of the furnaces of the United States Steel Corporation upon being blown out was discovered to have automatically prepared a hearth of its own more than 20 ft. in diameter.

A new record has been established in the life of a lining since the famous campaign of No. 3 furnace of the Tennessee Coal, Iron & Railroad Co., which made 1,429,707 tons on one lining. This record was equaled on Aug. 6, 1921, by No. 2 furnace of the Inland Steel Co. On Aug. 17 it had made 1,435,000 tons. As far as I know this furnace is still in blast and we all hope that it may make one and one-half million tons before being blown out, especially as it was making an average of 581 tons of iron per day, and occasionally made over 600 tons per day.

A new electrostatic process for the rough cleaning of blast furnace gas, invented by Sir Oliver Lodge and differing only in minor details from the Cottrell process, has been installed at a British blast furnace. The gas is cleaned only to approximately 1 gr. per cubic meter of gas, so that it is suitable for stoves but not for use in gas engines.

Malleable Castings

As members of the institute we may be very proud of the record made by our fellow member, Prof. Enrique Touceda, of Troy, in a research covering four years' work for improving the quality of malleable iron castings. The manufacturers found themselves under pressure from cast iron castings on the one hand and steel castings on the other, the first because of lower cost and the second because of higher quality. Several of them very wisely joined forces under the name American Malleable Castings Association, and

employed Professor Touceda to direct the research to improve the quality of the product. The result is striking and admirable. While the average strength of malleable castings in 1911 was less than 40,000 lb. per sq. in. and the elongation less than 5 per cent, the quality had been so improved that in 1919 many of the plants represented in the association were averaging better than 50,000 lb. tensile strength and 14.67 per cent elongation. Castings have been made as strong as 60,000 lb. tensile strength with an elongation of 33 per cent, and Professor Touceda thinks that what is now a singular achievement may become a matter of common practice in the course of time. The advance has been made not by means of revolutionary discoveries and inventions, but by gradual improvements and regularities in the process of manufacture.

Electrolytic Iron

Electrolytic iron has been made in the laboratory and in sporadic attempts on a commercial scale for 50 or 60 years, but it was not until 1915, at Grenoble, France, that the process was made both a technical and a commercial success. At the plant of Bouchayer and Viallet electrolytic boiler tubes are being made running about 99.97 per cent pure, using scrap as raw material and cast iron anodes, using ferrous chloride as an electrolyte and a rapidly rotating mandrel as a cathode. The deposited iron is annealed to rid it of the embrittling hydrogen and is ready for use as a boiler tube after a few drafts through a die, without a mandrel, to increase its strength. Mr. Bouchayer announces that he can compete commercially in the manufacture of thin tubes.

Charles P. Perin and F. A. Eustis, both members of this institute, have extended the process still further by using iron ore as the raw material. This is leached with ferric chloride, the solution reduced to ferrous chloride, and then this solution used hot as the electrolyte, having an insoluble anode and a rotating mandrel as a cathode. Electrolysis deposits iron on the cathode about 99.99 per cent pure and produces ferric chloride which is used over again for leaching. A characteristic of electrolysis is that a unit of electricity produces two or three times as much iron as can be produced by the same amount of electricity in the smelting processes.

Electric Furnaces

Electric iron ore smelting furnaces have been employed in North America but have never been commercially successful in competition, because of the cost of electricity. It is only in Sweden, where electricity is very cheap, in northern Italy and in Japan that electric smelting furnaces are now used in industrial operation.

*Address at meeting of New York section of American Institute of Mining & Metallurgical Engineers, Oct. 5, 1921.

Synthetic cast iron is being made on the Pacific Coast by melting steel scrap in electric furnaces and carburizing it. Last April I saw one of these furnaces and a few tons of the product. Just as Professor Cavalier has indicated in respect to the conditions in France, the manufacture of synthetic cast iron in this way is commercially advantageous where steel scrap is cheap and pig iron more expensive.

At the present time there are nearly 400 electric furnaces in the United States in iron and steel works.

Where hot iron or steel is required for castings and where high grade steel is manufactured, the cost of electric furnaces is justified, and we find them now not only in the steel casting plants, but also in iron foundries and in malleable cast iron foundries. They are also used in heating furnaces for rolling, and especially in heat treating furnaces for automobile manufacturers and others. The possibility of exact control is also employed with advantage in at least one instance in the use of an electric core oven.

Problems of Iron and Steel Metallurgy in France

BY PROF. J. CAVALIER

[In the early portion of his paper Professor Cavalier gives again the familiar facts concerning the iron and steel production of the French territory invaded by the German army; the extent of the French effort in the production of shells in 1917; the new iron and steel works built in France during the war; the destruction of French works by the Germans and the reconstruction that has been in progress in the past three years. Much of this ground was covered by papers read at the recent Paris meeting of the Iron and Steel Institute, as reported in THE IRON AGE of September 22 and 29.—Editor.]

The work of reconstruction of the destroyed plants is being pursued; and it will take several years more, especially for the collieries. On the other hand numerous plants in the interior of the country have grown and have put in new installations and more modern and better equipment. This work has been in general held up for a year or so by the rise in prices and by the industrial crisis common in all industrial countries.

At the end of the period of which I have attempted to show some essential characteristics, the dominant aim has been to produce at a maximum by the usual methods without seeking new ones. At the same time it is necessary to point out several things relating to the progress of the iron and steel industry.

Hydro-Electric Development

First, the development of the electric furnace. Among the European nations France is one of the richest in hydraulic power. One can put the total that can be put to use at 8,000,000 to 10,000,000 h.p., but it is not all available. At the beginning of the war they had equipped a little more than 1,000,000 h.p. of which 750,000 is in the Alps and 150,000 in the Pyrenees. The Pyrenees are certainly less rich than the Alps, but proportionately the hydro-electric industry was less developed there. This is about to be corrected. The equipment of a water system requires generally many months, often several years; also we hesitated to undertake this work as long as it was believed that the war would not last long.

It was only about 1916 that undertakings of long duration were begun. They have thus been able to equip in addition to what they already had about 400,000 h.p. while 400,000 h.p. more is actually in process of installation. It is necessary to take into consideration also the projects which are now being studied for the harnessing of the Rhone and the Rhine. Only a part of this new energy has been applied to the steel industry. The electric furnace has above all been reserved for high grade or special steels, to the preparation of ferroalloys and silicon-alloys, for which it is indispensable. The greater part of the electric energy was destined for purely chemical manufacture—electrolytic chlorine, chlorates and perchlorates and above all synthetic nitric acid—for which we had laid out and had begun to realize a vast program, when the development of torpedoing caused serious fear for the continuation of the supply of nitrate of soda from Chile.

The Electric Furnace in Iron and Steel

With the ending of the war these latter needs have almost disappeared. The plants equipped or in the process of installation have become available for

other uses, namely electric haulage for railroads, metallurgy, etc. I can cite in the neighborhood of Toulouse two plants, that of Pamiers and the Societe du Saut du Tarn a St. Jeury near to Albi which actually equipped important electric furnaces for the manufacture of steel.

Another plant in the Pyrenees region proposes to install a closed furnace for the direct treatment of ore and particularly for pyrite cinder. Although the electric furnace adapts itself well to the treatment of sulphide residues, it is nevertheless questionable whether the direct production of cast iron can be done advantageously in a country where electric energy finds so many remunerative uses.

Second, the electric furnace is used for the manufacture of synthetic cast iron according to the process outlined by Keller long before the war and which was used during the war. An electric furnace is charged with turnings and small scrap of iron and steel, with a given quantity of coal, in the presence of a slag which makes the operation more regular and in addition can bring about desulphurization. If it is necessary to increase the silicon content silica and the corresponding quantity of coke are added. The castings thus obtained are according to specifications and besides are very pure, particularly in regard to the sulphur content. The process has the advantage of permitting the easy utilization of turnings of which there was a great abundance during the war. It has furnished large quantities of cast iron for the manufacture of projectiles. It is always in use and gives to the foundry valuable products.

I have lately seen in the Pyrenees a plant making normally silicomanganese and which not being able to get rid of its stock on account of the industrial crisis utilizes part of its electric furnaces for the manufacture of synthetic cast iron. At the present prices of good cast iron and of scrap and turnings it is actually a paying operation. It is a matter of discussion whether it will be so when conditions have become normal once more.

Advances in Practice

Third, the development of the use of scientific methods. The progress realized by systematic study in the laboratory penetrates usually with slowness into industrial practice. Producers in the average industry are apt to consider the laboratory as a luxury which does not pay.

The war in bringing together for the national defense the industrialists and the men of science in the intensive production of metal has contributed powerfully to the employment and to the diffusion of new and precise methods of work and of control. The measurement of high temperatures has become very general, especially for the heat treatment of shells.

Microscopic examination was carried out systematically, as in the manufacture of cartridge cases, where the brass undergoes successive annealings. A simple and rapid microscopic examination shows whether annealing has been done at the right temperature and under the right conditions or if it is necessary to reanneal before further mechanical working.

In regard to the mechanical tests which are commonly used it is necessary to stress the Brinell test and the shock test on nicked bars. The Brinell

test has been used particularly to control the heat treatment of shells; they are "balled" before any treatment, after quenching and at the end of the treatment after drawing. Special schemes have been studied and put in practice for eliminating the influence of time in this test in order to allow great rapidity of execution without affecting the precision. On a series of pieces, 600 impressions an hour have been easily obtained. During the period when the manufacture of shells reached its maximum, say 300 to 400,000 a day, we can figure that there were 800,000 Brinell tests made each day.

The shock test on nicking bars, which measures the resilience, made its appearance before the war but it was introduced very timidly. It met with much opposition on the part of the producers. During the war the aeronautical branch, which had need of exceptional guarantees, found the introduction of this test indispensable in the inspection of crank shafts and con-

necting rods for aviation motors. All these rods had to undergo the shock test. They had to reach a number corresponding to 9 to 10 kg. m. on a test bar having a section of 10 x 10 mm. with a nick of 2 x 2 mm. with a round base.

These different methods were doubtless employed before the war in a small measure. They rapidly became common even in the most old fashioned workshops. By a constant and accurate control they caused large reduction of rejections and in this way speeded up production. The manufacturers have accepted in specifications clauses which they would have nothing to do with previously.

The good habits which were taken on under the force of circumstances will continue without doubt. And thus the war will have contributed to the progress of our metallurgical industry in a measure which only compensates to a slight extent for the great losses resulting from the destruction of our works.

Problems in Metallography

BY WILLIAM CAMPBELL

In looking over the work of the last three years there are several points which stand out above others as worthy of notice. The first that I should like to mention is the determination of non-metallic impurities in both carbon and alloy steels. In the old days it was easy to call all black inclusions silicate and all gray ones manganese sulphide. But in using metallography as a means of testing you cannot say that a section of steel analyzing 0.004 per cent or less sulphur, which is full of gray inclusions, is full of manganese sulphide unless you assume that the chemist is wrong. We now know that most of these gray inclusions are oxides and we are hopeful that in the future we may be able to determine their variations between oxide of iron and oxide of manganese, etc. The slag inclusions found in steels, especially alloy steels, are not always simple and in many cases are very complex, showing three or more constituents.

Study of Non-Metallic Impurities

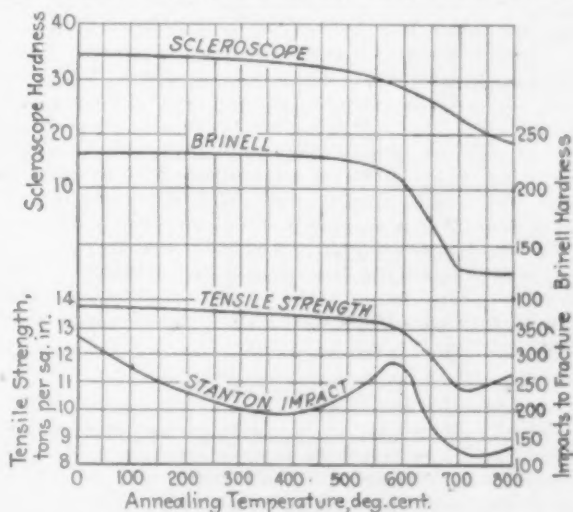
Some time ago we took up this work once more in our laboratory at Columbia and after examining a number of typical slags set out to examine non-metallic impurities. We had not got far when our attention was called to the fact that many inclusions were a combination of furnace slag, ladle lining, etc. One typical case may be mentioned. A piece of wrought iron was found which could not be cut with a saw and which resisted the drill. It was nicked and broken and in the center there was found a comparatively thick layer, a non-metallic impurity of black color extremely hard resembling a piece of well-made china.

We have all heard of pieces of brick found in the interior of ingots and have wondered how the brick ever got through the ladle stopper, and so here we wonder how this strange non-metallic impurity got into the wrought iron. Committee E-4 of the American Society for Testing Materials at the June meeting of the society presented a report in which a discussion of the determination of these non-metallic impurities was begun and it is hoped that by next year a definite scheme for their identification can be worked out.

Tempering Effects

The effect of tempering on plain carbon and alloy steels has received considerable attention. Most of the published work refers to tensile tests and there is a wonderful concordance between drawing temperature and tensile strength, elastic limit, ductility and hardness. On the other hand, shock tests do not show this same concordance and some of the recent work published abroad would seem to show that a medium drawing temperature while all right for tensile tests is absolutely fatal for shock tests. If this is so it will certainly explain many mysterious failures which may be attributed to too low a drawing temperature.

Improvements in cast iron have been particularly in the direction of obtaining high tensile strength. Such metal is often called semi-steel. The effect of annealing of semi-steel and gray iron castings and its usefulness is often questioned. From work done during the past three years in the Navy Yard we have



Effect of Annealing Temperature on Hardness and Tensile Strength of Cast Iron Pistons

reached definite conclusions. It has been found that by annealing at 1000 deg. Fahr., while all stresses and casting strains are eliminated, the tensile strength is in no wise affected. On the other hand, if the metal is heated to the neighborhood of the critical point the tensile strength falls off very sharply. This is in agreement with the work of Rolfe published in the *Aeronautical Journal*, 1917, page 349. Rolfe gives curves, which are reproduced herewith, showing effect of annealing temperature on the hardness and tensile strength of cast iron pistons. He also shows a curve for Stanton impact which is worthy of notice as there is a minimum at 350 deg. C. and a maximum about 575 deg. C. followed by a rapid decrease. Under the microscope we have found a very marked change which occurs at the point where the tensile strength falls and explains it. All of the pearlite disappears and the matrix consists entirely of fine grained ferrite.

Investigation of Hardness and Grain Growth

In the past we have had many theories of hardening. Most of these are now well known but most of them are far from convincing. The latest theory is that of Jeffries and Archer, the slip interference theory, which was published in *Metallurgical and Chemical Engineering*. This theory applies both to the strain hardening of metals and to the hardening of

steel and to my mind fits into the experimental facts better than any other.

Another subject of great interest is what used to be called Stead's brittleness in low carbon steel which has been widened to embrace all abnormal grain growth in metals. Many writers have attempted to explain this. The recent work of Carpenter and Elam in the British Institute of Metals has thrown much light on the subject. They distinguish between grain growth and recrystallization and show that with a small amount of strain grain growth occurs, whereas

when the strain is increased we get recrystallization on heating. They show that grain growth and recrystallization are two entirely distinct phenomena.

Lastly, the recent work on the structure of crystals especially applied to metals is of great interest and promises to modify many of our ideas. The work of examination by X-rays and the determination of the changes brought about by strain in the space lattice is yielding remarkable results and it is hoped that in the near future that the work of Jeffries and his associate will be available.

Graphitic Corrosion of Cast Iron

BY J. VIPOND DAVIES

IN all engineering structures the question of deterioration and life is second only in importance to that of original manufacture and construction. This particular subject is one of considerable importance in the life of a large class of engineering structures. The engineer is always looking for better materials and it is the duty and function of metallurgists to produce materials suited to the needs of the engineer and to the requirements and functions of the structures produced.

About 100 years ago the subject of deterioration of cast iron when exposed to the influence of salt and other impure waters exercised engineers very seriously and various facts were recorded and theories advanced, but apparently without any more serious attention. The reason for this was easy of understanding. Cast iron as a material of construction was replaced by the stronger and more reliable alloys of steel. Cast iron as a material of construction has not, however, been entirely replaced by steel, as much continues to be used in marine and underground construction. Then followed the introduction of electric power for railroads and lighting purposes and some 30 or 40 years ago, when the installation of electric power was in its infancy, the design was crude, and there was a lack of understanding that the return currents must be led back to their power stations. The result of this was that we learned a great deal about electrolysis of pipes and other underground structures.

Not All Electrolysis

Now, I claim that an immense amount of what has been classed as electrolysis in these underground structures was not electrolysis at all in the ordinary meaning of the term. Electric currents may produce an accelerated condition of corrosion in cast iron, but the same process is going on continuously, under conditions of impure water and suitable character of metal, where no electric currents exist and where the action is purely a chemical process.

I have carried on a good deal of investigation during the last 12 years and have subjected many hundreds of specimens of cast iron to different waters and under different conditions, and I feel that I have proved to complete satisfaction that the passage of electric currents in the soil is not the usual cause of corrosion, although if there should be such currents, unquestionably the action would be accelerated. I have proved this by subjecting many samples to the same water and to the same test conditions—some samples carefully insulated from any possibility of transmitting currents and other samples exposed in position where such currents if present might be transmitted. Many other samples subjected to the same water under the same conditions and for the same periods show most variable results. Some of these samples will be deeply affected by graphitic corrosion, while others may show no trace.

A Complete Molecular Change

What is the character of this graphitic corrosion? It indicates itself by a complete molecular change in the structure. A polished and weighed specimen of gray foundry cast iron, exposed in soil saturated with

ground water high in sulphates or chlorides or with free CO_2 present, will, in the course of from one to five years, change its character. The volume of the sample remains constant. File or tool marks on the original sample will remain and appear in the changed sample when removed. The color, however, from a metallic character has become dull black. The edges and angles remain sharp. With a penknife it can now be whittled away like cheese. The fragments whittled off the samples, dropping on a paper, will char or ignite the paper, due presumably to rapid oxidization on exposure to the air.

The records of guns and cannon balls, which were submerged from 100 to 200 years in the sea and then recovered, indicate that when they were removed from the water and the attempt was made to saw them they have ignited and even exploded, notwithstanding that the samples had just been removed from the water. When the samples were allowed to remain out of the water for a month there was no apparent change in the external appearance, except perhaps a little reddening of the surface by apparent oxidization of metallic particles; but the material, having dried out, again became hard, so that it was difficult even to scratch the surface with a knife. Presumably the action which has proceeded in the metallic iron during its exposure has been that of dissolving the iron by soluble salts which have leached out. At the same time it can be borne in mind that the external dimensions and volume of the sample have not appreciably or measurably changed.

We cannot attribute such action to the passage of electric currents in the ordinary understanding of these terms, for the reason that electric currents do not run around aimlessly in the soil but on a path of least resistance to get back to their source of origin. Whatever change there is must come from internal action in the metallic mass.

Varying Chemical Conditions

The process of this graphitic corrosion has been noted in great numbers of cases in the following:

- (a) Clear normal sea water, although the records indicate that the action is more rapid in warm sea water than in cold climates.
- (b) In water having salts in solution and showing acid reaction.
- (c) In water having salts in solution and showing alkaline reaction.

The period of time in which this condition appears is quite short. In a soil impregnated with salt and other impure waters, particularly those high in acid sulphates, a sample $\frac{1}{2}$ -in. rectangular section will have graphitized completely in from two to three years. I have noticed recently a case of a water pipe, which had been subjected to clear sea water, where large blisters of hard scale, about $\frac{3}{4}$ in. thick, have been removed and found the graphitic action proceeding into the metal underneath, and to all intents and purposes protected by the corroded scale blisters.

Coming to the chemistry of the subject, the following table indicates the averages of a number of samples

of actual cast iron metal subjected to experiment and of the graphitic substance resulting from corrosion:

	Average of Cast Iron Samples Per Cent	Graphitic Substance Per Cent
Total carbon	3.29	10.82
Graphitic carbon	3.08	9.68
Combined carbon	0.21	1.14
Silicon	2.79	8.41
Phosphorus	0.745	1.920
Sulphur	0.087	0.870

Analysis of Graphitic Substance

Again the chemistry of the graphitic substance resulting from the corrosion is as follows:

Total carbon	10.82
Graphite	9.68
Phosphorus	1.92
Sulphur (total as S)	1.30
Sulphur (H ₂ S as S)	0.87
Sulphur (SO ₄ as S)	0.43
Silicon	8.41
Manganese	0.68
Iron (total as Fe)	43.70
Iron (free as Fe)	7.54
Iron (combined as Fe)	36.16
Moisture (loss at 110 deg. C.)	5.92
Water of hydration and oxygen	Remainder
Calcium, magnesium and aluminum	None
Chlorides	Some
Carbonates	None
Water soluble iron	Some

From this analysis it will be noted that all the metallic iron which remains in the sample unoxidized is 7.54 per cent of the mass, and the total iron remaining in the mass combined in the form of oxides is a comparatively small percentage of the original metallic iron in the original sample. It is evident, therefore, that a large portion of the iron itself has been leached out into the waters of the soil.

It is apparent from this that whatever action is going on is within the mass of the sample exposed. In view of the conflicting evidence obtained from the results of experiments in respect of impurities in the water, and in view of the failure to account for these conflicting results by differences in the chemistry of the original iron, it may possibly be indicated that the action producing the change is closely related, not simply to the graphite contents in the cast iron subjected to these impure waters, but in part or in large measure to the physical characteristics and molecular structure of the alloy itself.

From my study of this subject, which affects many lines of engineering work, I find in its history and bibliography very little information. It appears to be one of those matters which have been assumed to exist and have not been followed up to scientific conclusions.

Questions Yet to Be Answered

In presenting this, therefore, to you, as metallurgists, responsible for the production of suitable materials of construction, I propound to you the following questions, which represent the problem which we as engineers are investigating and which you as metallurgists should endeavor to solve:

As similar conditions of graphitization have been noted in cast iron placed in soils both acid and alkaline, what is the chemical process which converts cast iron in such salt or foul water from iron into graphite and other substances?

Is the process the same in acid or alkaline waters and what salts produce these results?

To what extent and what is the process under which such conversion extends into and through the mass of cast iron? (Note that cannon balls immersed 100 or more years have been recorded as completely converted.)

Is the chemical action or change a progressive one proceeding indefinitely, and what is the relation between chemical composition of the bath and rapidity of the change?

Is there anything in the suggestion, made as far back as 1840, that iron immersed in chemically impure waters constitutes a "voltaic cell," causing electric or galvanic circuits between the water and the iron which accelerate or produce the process of graphitization; or,

going further, may it not possibly be an internal process of electrolysis?

What chemical alloys of cast iron might be expected to be immune? It has commonly been stated, with doubtful proof, that white irons are immune.

What iron coating to cast iron might protect it when immersed in impure water?

What material in the surrounding bed (lime or other substances) might, by neutralizing the injurious effects of ground water, protect the metal? Similarly in marine construction what means can be adopted to protect exposed metal?

What is the condition existing in the graphite removed from its bath whereby it spontaneously ignites or explodes?

What are the causes which produce re-hardening of graphitic material after drying out?

If the presence of carbon in graphitic form is shown to be the primary cause of corrosion, may it be possible, by subjection of castings to heat treatment either in the liquid state before pouring molds or after casting, by an annealing process to so change the graphite into a combined form of carbon content as to lessen the danger of this form of corrosion without thereby reducing the strength or durability of the castings or increasing appreciably the cost?

Further Gain in Steel Ingot Output

The steel ingot output in September shows a smaller relative increase over that of August than was made in pig iron. According to the statistics of the American Iron and Steel Institute, 30 companies which in 1920 produced 84.20 per cent of the total had an output in September of 1,174,740 gross tons. This compares with 1,138,071 tons in August, and the increase is about 3 per cent, whereas pig iron increased 7 per cent. Estimating the production of the other companies on the basis of those reporting, the total output of ingots in September would figure out 1,395,178 tons. There were four Sundays in September and the Labor Day holiday. A good many plants made a half day's output of ingots on Labor Day. Therefore, reckoning 25.5 operating days, the daily output in September may be put at 54,713 tons, whereas that of August was estimated at 50,060 tons per operating day. In the table below the output of Bessemer and open-hearth works is separated and the figures for 1920 by months are included:

Monthly Production of Steel Ingots by 30 Companies Which Produced About 84.20 Per Cent of Total in 1920—Gross Tons

	Open Hearth	Bessemer	All Other	Total
January, 1920...	2,242,758	714,657	10,687	2,968,102
February	2,152,106	700,151	12,867	2,865,124
March	2,487,245	795,164	16,640	3,299,049
April	2,056,336	568,952	13,017	2,638,305
May	2,251,544	615,932	15,688	2,883,164
June	2,287,273	675,954	17,463	2,980,690
July	2,135,633	653,888	13,297	2,802,818
August	2,299,645	695,003	5,784	3,000,432
September	2,300,417	693,586	5,548	2,999,551
October	2,335,863	676,634	3,485	3,015,982
November	1,961,861	673,215	3,594	2,638,670
December	1,687,162	649,617	3,586	2,340,365
Total, 1920...	26,197,843	8,112,753	121,656	34,432,252
January, 1921...	1,591,281	608,276	3,629	2,203,186
February	1,295,863	450,818	2,796	1,749,477
March	1,175,591	392,983	2,404	1,570,978
April	1,000,053	211,755	2,150	1,213,958
May	1,047,810	216,497	1,543	1,265,850
June	808,286	193,644	1,476	1,003,406
July	689,489	113,312	575	803,376
August	915,334	221,116	1,621	1,138,071
September	908,381	265,152	1,207	1,174,740

The September ingot production was at the yearly rate of nearly 17,000,000 tons, counting 311 operating days to the year. This compares with a rate in August of 15,568,660 tons and in July of 11,857,186 tons. The greatest year in ingot production was 1917, when the total was 43,619,200 tons.

It will be noticed in the above table that the output of open-hearth steel was actually less in September than in August, the increase being contributed by Bessemer steel. This comes from the fact that sheet and tin plate works were more fully operated in the latter part of the month.

Permission to Reduce Ore Rates Granted

Move is Regarded as Entering Wedge of General Rate Lowering—Will Not Probably Affect Large Tonnage as Furnaces Are Well Supplied

BY L. W. MOFFETT

WASHINGTON, Oct. 11.—Reduction of 28 per cent in freight rates on iron ore in official classification territory, which will take place on or about Oct. 16, marks only one of the moves now definitely determined upon by the railroads to bring about a general lowering of transportation costs throughout the country. Responsive to a prolonged and insistent demand the railroad executives, after conferences with President Harding, Secretary of Commerce Hoover, members of the Interstate Commerce Commission and Chairman Cummins of the Senate Committee on Interstate Commerce, have finally yielded to the contention of iron and steel manufacturers and others of the industrial world that this move is essential in order to bring about a return to normal business conditions. For the past few weeks there have been distinct evidences that the railroad executives of the country were becoming reconciled to this conviction and were preparing to accept it. While rates have been reduced gradually in numerous lines from time to time, including those on iron and steel products for export through Atlantic and Gulf ports, the demand for a general reduction still persisted and increased in force. The final decision reached by the railroads to meet it therefore has been a source of gratification and belief that when effected it will be a highly important element in stimulating business because it naturally will carry with it a revision of railroad wages as an offset to the lower rates.

Result of Pressure

The voluntary action of the railroad in making application to cut rates on iron ore in official classification territory undoubtedly was the result of strong pressure brought by the iron and steel trade, and may or may not have been calculated as a preliminary to a general cut of freight rates, involving the general iron and steel lines along with others, but in any event it is looked upon as being a step that will expedite the general movement to establish lower rates. Permission to reduce the iron ore rates on five days' notice was granted yesterday by the Interstate Commerce Commission after examination of the application made for this purpose on behalf of the carriers by R. H. Collyer. By the terms of the application the lower rates are to expire Dec. 31, though this is largely a formality. Further conferences are to be held between the railroads and the iron and steel trade before the new rates expire and it is confidently expected that they will be made permanent if not further reduced. In themselves the lowered rates are not taken to mean a great deal, but rather it is the significance they convey that finds importance because a general cut in all iron ore rates, as well as iron and steel and commodities of other kinds, is being looked for.

Effect of Cut in Rates

The cut in the ore rates, confined as it is to official classification territory—bounded on the west by the Mississippi river, on the north by the Canadian border, on the south by the Ohio and Potomac rivers and extending to and including the Atlantic seaboard—comes at a time when the bulk of direct shipments

originating in the upper mines of the Lake Superior region has been moved for the present season. To a large extent, therefore, the reductions will apply only to dock ore at Lake Erie ports, a relatively small tonnage, together with movements from the East, also relatively small. Blast furnaces along the Lake Erie front will not be affected because no change has been made in rates from Lake Superior mines to Lake Erie ports, rates which now are the object of protest, and which it is believed will be lowered, either by voluntary action or by order of the Interstate Commerce Commission. The navigation season being near to a close, however, the advantage to the iron and steel industry will not be reflected so far as this important ore movement is concerned until next year, regardless of how soon the rail-and-lake rates may be reduced.

Reason for Action

The reason assigned for lowering the ore rates in official classification territory is a desire to stimulate the iron and steel industry and give it an opportunity to accumulate ore stocks before the close of navigation on the great lakes. While it is thought this will be done to some extent, it is doubted that, at this late period in ore shipping from the upper mines, especially in view of restricted operations of the steel mills, the stimulation will be of a marked nature, though the significance back of the move, it is held, will unquestionably have a decidedly good effect in the future.

The First Move

It is interesting to observe that the first move toward lowering ore rates was made by the Lehigh Valley railroad, which filed a tariff on Sept. 28, to become effective Oct. 29, reducing the ore rate from Perth Amboy, N. J., to Bethlehem, Pa., from \$1.40 to \$1 per gross ton, a reduction of a little more than 28 per cent, or practically the same as that determined upon later by all carriers in official classification territory. There is a question as to whether this action of the Lehigh Valley was a factor in bringing about the general reduction in this territory which returns the ore rates in the territory affected almost to the level they were established on before the general rate advance of last August. At the time the Lehigh Valley tariff was filed, it did not create much interest, but was looked upon as being a local matter entirely and this was heightened by reason of the fact that Perth Amboy is not a port of origin of iron ore. However, it was apparent that if the Lehigh Valley were allowed to establish a rate of \$1 per ton from Perth Amboy while other railroads kept up their rates from other ports, import business would come through that port to the disadvantage of other ports and other carriers.

Revenues of Railroads

While there is talk about the lower ore rates adversely affecting the revenues of the railroads, it is pointed out that, on the contrary, it may easily increase their financial returns through a much greater volume of ore and other raw materials and iron and steel traffic, once satisfactory levels are established on

(Continued on page 976)

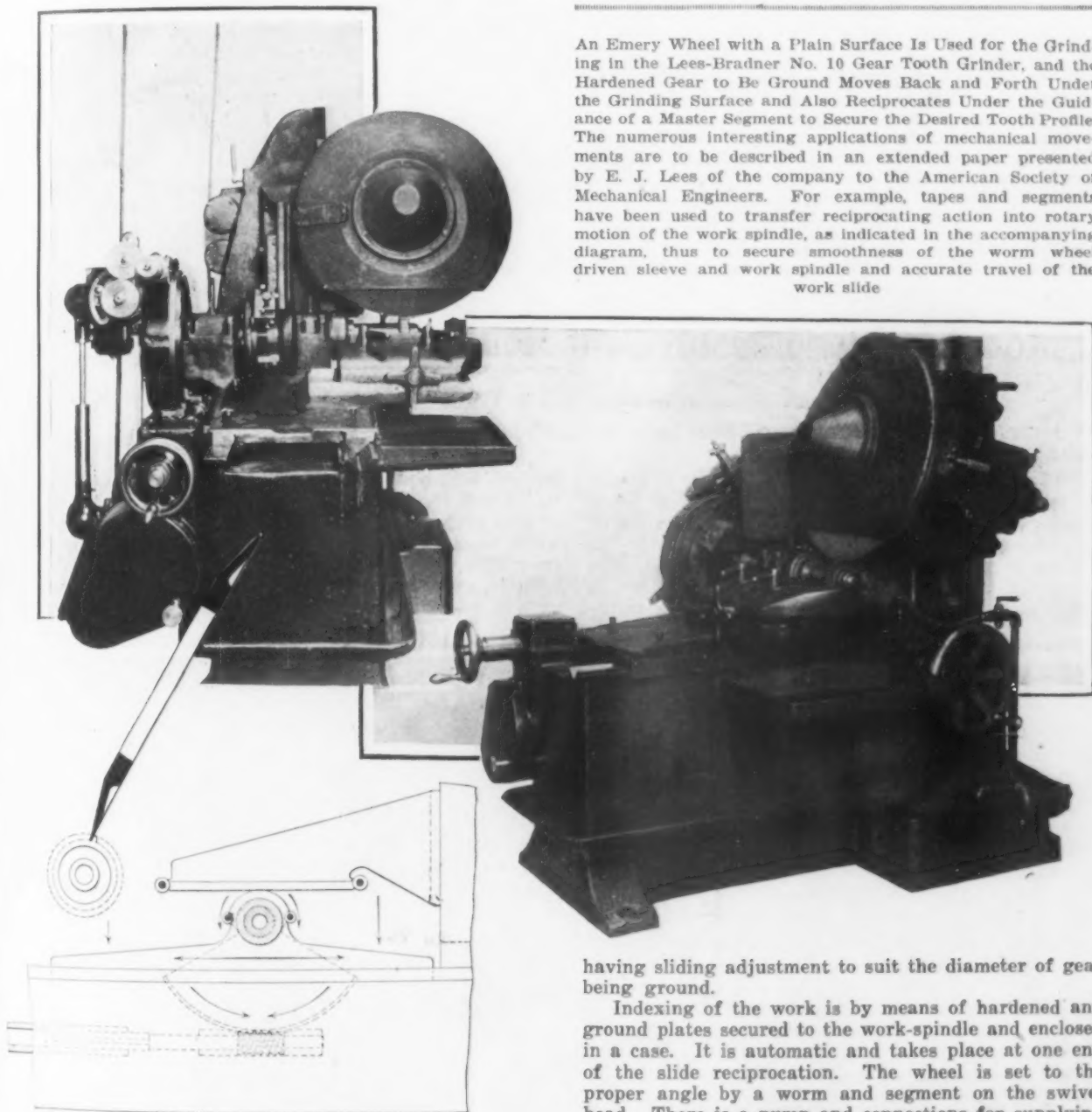
Gear-Tooth Grinding Machine

The production of hardened gears, accurate as to profile and spacing of teeth and with the bore accurately concentric with the pitch circle, is the purpose of a machine recently developed by the Lees-Bradner Co., Cleveland. It is designated as the No. 10 gear-tooth grinding machine, photographic reproductions of which are given herewith.

The machine is adaptable to the grinding of involute spur gears having angles of pressure from $14\frac{1}{2}$ to 24 deg.; diametral pitch from 12 to 3; and pitch diameter

It is mounted in a ball socket container which can be swivelled to any angle, permitting using the diamond face on all its edges. The container is locked into the arm, which is both worm and wheel and hand controlled, so that either a fast spiral cut or a slow continuous cut may be taken on the wheel face. The dresser is carried by the main swivel head casting, locating the diamond point in one plane. Adjustment is made end-wise of the wheel when taking a dressing cut.

The machine is driven by belt from the lineshaft or by motor. The drive to the wheel is by endless belt guided by two idlers which are carried in a bracket



An Emery Wheel with a Plain Surface Is Used for the Grinding in the Lees-Bradner No. 10 Gear Tooth Grinder, and the Hardened Gear to Be Ground Moves Back and Forth Under the Grinding Surface and Also Reciprocates Under the Guidance of a Master Segment to Secure the Desired Tooth Profile. The numerous interesting applications of mechanical movements are to be described in an extended paper presented by E. J. Lees of the company to the American Society of Mechanical Engineers. For example, tapes and segments have been used to transfer reciprocating action into rotary motion of the work spindle, as indicated in the accompanying diagram, thus to secure smoothness of the worm wheel driven sleeve and work spindle and accurate travel of the work slide

having sliding adjustment to suit the diameter of gear being ground.

Indexing of the work is by means of hardened and ground plates secured to the work-spindle and enclosed in a case. It is automatic and takes place at one end of the slide reciprocation. The wheel is set to the proper angle by a worm and segment on the swivel head. There is a pump and connections for supplying coolant. The work can be held between centers or supported on a mandrel having a taper shank to fit the spindle and supported at the outer end by the tailstock.

Power is not applied to the work slide but to a sleeve through which the work spindle rotates when indexing. When the machine is grinding, the sleeve and work spindle rotate together as one unit. The sleeve carries the segment to which one end of each of the tapes is fastened, the other ends being attached to a bracket on the column. When the sleeve is rotated first in one direction and then in the reverse, the tapes wind on and unwind from the segment, thus through their pulling action on the bracket causing the work slide to reciprocate. This arrangement provides a uniform torque load to the work spindle by a worm and wheel that rotates the sleeve in reversed directions. There is also uniform load on the tapes due to the fact

from 2 to 12 in. After hardening, the bore is ground first and all grinding operations on the teeth are controlled from the bore. The teeth are thus ground concentric with respect to the bore.

An emery wheel 30 in. in diameter is used, the wheel being supported on a stationary column and the work traverses past it back and forth on a slide. The work is given a rotary as well as the sliding motion in order to obtain the desired profile action. A segment equal to the pitch diameter of the gear is used in conjunction with tapes or bands to obtain the combined sliding and rolling action. These segments are modified in various ways to give the changes in tooth profile.

A diamond that is both lever and screw controlled is provided for truing the face of the wheel and is used in conjunction with the wheel spindle micrometer feed.

that the frictional resistance of the work slide on the ways is maintained constant by gravity only.

Using an emery wheel with a plane surface when generating does away with the problem of centering the tool and blank, the relation of the wheel to tooth being shown in the illustration. The plane face also has a continuity of action with profile of the gear tooth.

The main pulley shaft drives the gearing in the reverse feed box shown on the right hand end of the machine and speed change gears are used to vary the strokes per minute of the work slide. The length of travel of the slide is regulated by a trip dog inside the gear case.

In operating the machine a segment equal to the pitch diameter of the gear to be ground is located on the work spindle. The emery wheel is then set at the pressure angle of the tooth to be ground and the head carrying the wheel raised to the height necessary to cover the working depth of the tooth. The wheel is dressed, using the micrometer adjustment, and then moved to the starting position by the handwheel. There are two positive stop pins in a circular T-slot which are used in conjunction with a positive stop to locate the wheel in a start and finish position. There is also an intermediate spring stop for roughing out. The starting stop is usually set to grind 0.004 in. from the tooth.

The work is locked on the arbor, with a tooth in contact with the wheel face, after which a roughing cut is taken, the wheel being located by the spring stop to cut 0.003 in. from each tooth. Then the micrometer is fed up 0.001 in. more to the finish stop, making the 0.004 in. allowed for grinding. This brings the wheel back into the generating plane and into the position in which it was dressed. When the wheel needs re-dressing which is usually for every other gear, 0.0004 in. is taken off the face, and this is done by using an independent feed to the micrometer, a disturbing of the stops for starting and finishing being unnecessary.

For roughing cuts a gear hobber is said to be the most suitable inasmuch as that method uses the same principle as the grinder with the plane face. Other types of machines can be used, however, with modification in the cutter outline. As to production, it is claimed that on a 6 pitch gear having 31 teeth the actual grinding time consumed is 10 sec. per tooth or a little over 5 min. around the gear, removing 0.003 in., on the rough grind and 0.001 in. on the finish grind. A total time of 11 min., with loading and unloading time of 2 min., averaging 30 gears per day of nine hours is said to be accomplished. It is further claimed that 2500 gears of the size under consideration can be ground without renewal of the wheel.

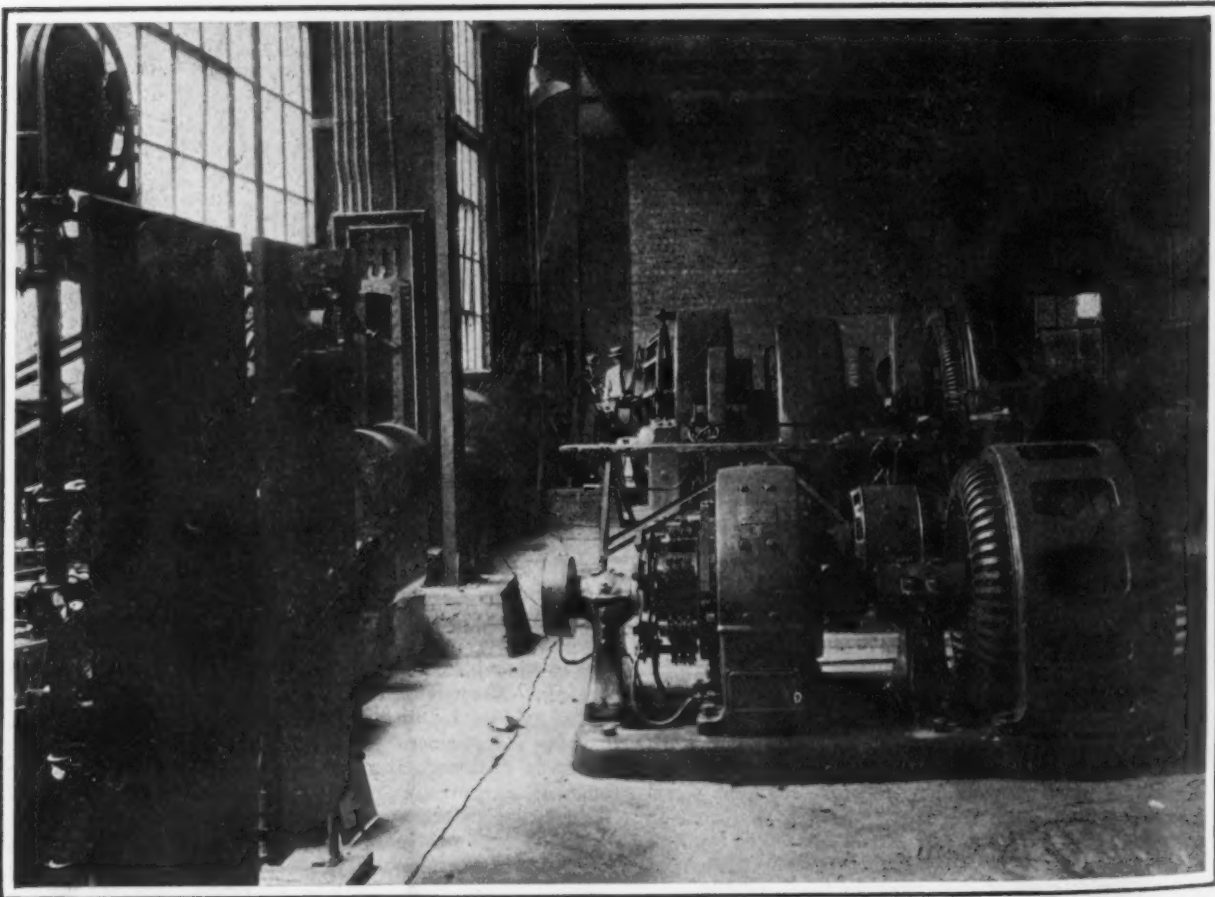
Motor Drives Featured on Rolls and Run-Out Table

Special Methods Adopted in New Mill to Co-Ordinate Roll Trains and Run-Out Table—Three-Phase Motors and Frequency Changers Used

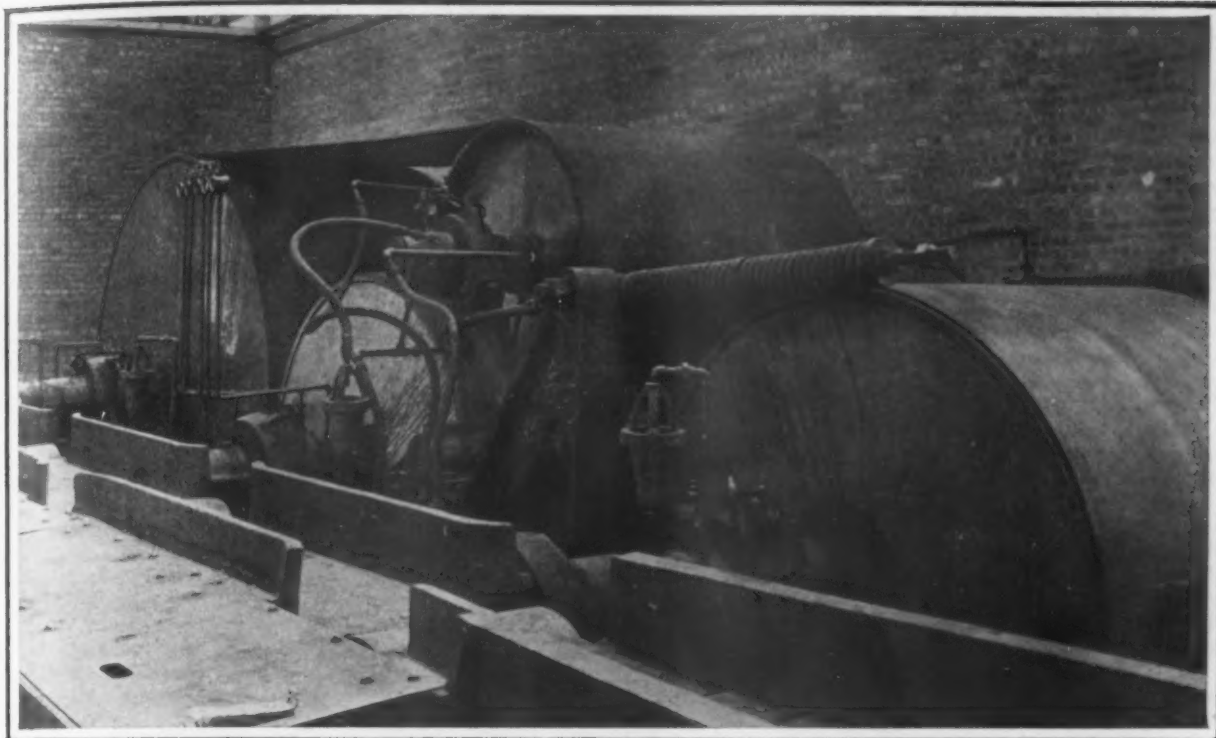
SOME of the powering features of the new merchant mill of the Interstate Iron & Steel Co., at South Chicago, which was described in last week's issue, are of more than ordinary interest.

Electric current is furnished by the Commonwealth Edison Co., Chicago, and stepped down from 12,000 to 2300 volts for use in the mill motors. All of the trans-

formers were built and installed by the General Electric Co. Three 1667-kva. single-phase transformers, a total of 5000 kva., step down the current for the mill motors, while three 37½-kva. transformers step down current from 2300 volts to 110 volts for lighting purposes. In addition, there are two General Electric motor-generator sets, which furnish 230-volt direct current for use in



Ninety-three ½-Hp. Alternating Current Motors Driving the Runout Table Rollers Receive Their Power from the Frequency Changer in the Foreground. This consists of a 110-hp. adjustable speed direct current motor, with speed range from 780 to 420 r.p.m., and an alternating current generator rated at 110 kva.



Belt Drums Driving the Finishing Mills. These have since been inclosed in a cage, for protection of employees. The belt drive is said to give smoother operation of the rolls than gear drive

the auxiliary motors, in the traveling cranes, and for miscellaneous purposes. These sets will be tied up with three others now being installed in the former power station of the Interstate company, making five motor-generator sets, which in common will furnish direct current for general service in the entire plant.

As the six 16-in. roughing stands of the mill are all in line (continuous), they are driven from a line shaft by gears. The shaft is operated by a constant speed 3-phase, 60-cycle, a. c. 1500-hp. Allis-Chalmers induction motor, which runs at 78 r. p. m.

The 14-in. and 12-in. stands are driven by a 3-phase 60-cycle a. c. 2000-hp. Kraemer type variable speed Allis-Chalmers induction motor. The power of the motor is distributed by belt drums to three shafts, one shaft operating the two 14-in. stands, and the other shafts two 12-in. stands each. Although engineers are not entirely agreed on the relative merits of gear and belt drive, it is urged on behalf of the latter that it in-

dures smoother operation than propulsion by gears. There is always a certain amount of backlash in gears, and when steel is entering intermediate stands, vibrations are sometimes set up in the finishing stands, which often prove serious when light material is being rolled.

Each of the 93 rollers of the run-out table is driven individually by its own alternating current motor of $\frac{1}{2}$ hp. The motor speeds can be varied from 370 to 210 r.p.m., with a frequency range from 26 to 14 cycles.

The motors receive their power from a special frequency changer built by the General Electric Co., which consists of a 110-hp. adjustable speed d. c. motor, having a speed range of 780 to 420 r. p. m., and an a. c. generator rated at 110 kva. The operator of the set adjusts his speed in accordance with the speed changes in an adjustable speed Kraemer-type a. c. induction motor, which drives the finishing mills. Thus the speed of the motors driving the run-out table rollers is regulated to the delivery speed of the finishing mills.

Course of Instruction in Safety Methods

A course of instruction in Safety First methods and Accident Prevention for the superintendents, foremen, and gang leaders of all the industrial plants in the Braddock, Rankin and North Braddock, Pa., district will be inaugurated at the Braddock Carnegie Free Library auditorium Thursday evening, Oct. 13. The course is sponsored by O. J. H. Hartsuff, general superintendent, Edgar Thomson Works, Carnegie Steel Co., and will be conducted along the same lines as the safety school held by the National Safety Council last spring in the Pittsburgh Chamber of Commerce.

The Edgar Thomson Works has made a remarkable record in safety and accident prevention this year. Not a single injured employee at present is listed as a "hospital case," and it was to maintain this record and prevent future accidents that the school was inaugurated. Originally intended for Edgar Thomson foremen, at Mr. Hartsuff's suggestion, the scope of the instructions school was widened to include all foremen of industrial plants in the district. Those completing the course will receive diplomas from the National Safety Council.

Six lectures, on six successive Thursday evenings, are planned. The program is:

Oct. 13—"The Spirit of Industry," Dr. R. M. Little, of the New York State Industrial Commission.
Oct. 20—"The Foreman's Place in Accident Prevention," J. A. Oertel, Chief of Safety Bureau of the Carnegie Steel Co.

Oct. 27—"The Workman's Place in Accident Prevention," by Mr. Martin, an employee in the Union Mills Machine Shop, Youngstown, Ohio.

Nov. 3—"Eye Protection and Safe Clothing," F. H. Trego, formerly of the Mine Safety Appliance Co., Pittsburgh.

Nov. 10—"Electrical Hazards," E. Friedlaender, of J. A. Morgan, of Edgar Thomson Works, Carnegie Steel Co., electrical department.

Nov. 17—Graduation Exercises, to be addressed by Dr. William T. Dorward, Milwaukee, Wis.

The following general committee has been appointed to make all arrangements: John B. Trusel, chairman, safety director, Edgar Thomson Works; John A. Oertel, safety director, Carnegie Steel Co.; J. E. Lose, Carrie Furnaces; Thomas Crombie, McClintic-Marshall Co.; S. Baum, Columbia Steel & Shafting Co.; John D. Price, Wilson Snyder Centrifugal Pump Co.; Peter Toner, American Chain Co.; A. R. Blainer, Consolidated Expanded Metal Co.; A. M. Kremkau, Copper Clad Steel Co.; John Hockenberger, Benner Tool Co.; E. M. Patterson, Duquesne Light Co.; L. H. Lesimore, Nicholson Chain Co.; James Weeks, Pittsburgh Machine Tool Co.; Joseph Tronsberg, Jr., Acheson Mfg. Co.; B. D. Peters, Rankin Works, American Steel & Wire Co.; George Garver, Braddock Works, American Steel & Wire Co.; Joseph Conner, Sterling Steel Foundry Co.; D. R. Ferguson, J. A. Morgan, David Scott, F. A. Power, F. H. N. Gerwig, Joseph A. Lawler, John Lloyd, and F. F. Slick, of Edgar Thomson Steel Works; W. Milroy of the Union Railroad and F. R. Wilhelm, Rankin Car Barn.

New Mechanical Gas Producer

A number of new features are embodied in the gas producer recently put upon the market by the W. R. Miller Co., Pittsburgh. It differs chiefly from others in having the principal blast distributor on the exterior. It is pointed out that a distributor located in the interior of the producer will be necessarily of large dimensions, or built with arms or branches, to secure sufficient distribution of the blast to gasify the coal thoroughly. Moreover, interior distributors impede the free discharge of ash or clinkers. Clogging of the distributor, and even its destruction from heat, may well result from interference with the discharge of refuse; and, since considerable time is required to replace it there is danger that the producer may be rendered non-continuous.

It is further claimed for the Miller gas producer that since it permits the free discharge of ash, the regular lowering of the fuel bed is possible without disintegration, and the formation of rivers or channels, through which hot gases escape, is prevented. A small distributor is located in the interior, but, if this clogs or burns out, it can be replaced without interruption to operations, since the blast from the exterior distributor may be maintained. The ashes are removed from a water-sealed revolving ash pan by lowering the stationary ash shovel, and then discharged into a can or bucket, or onto a conveyor.

Another feature is the easy accessibility of the grate sections through the sealed doors outside the windbox. A blank space in each section, it is claimed, prevents the blast from cutting channels through the interior. The grate sections being protected by the blast, their life is lengthened.

The producer has a double feed, designed to prevent the escape of gas, and since it operates automatically, the flow of fuel into it is regulated. Another important feature is a rotary wall cleaner, intended to keep the producer walls free from clinker. This cleaner, which is water cooled, rotates within itself in close proximity to the revolving walls.

The working force of the Gilbert & Barker Mfg. Co., West Springfield, Mass., will be increased by 200 men within the next two weeks coincident with the completion of its new foundry. As a result of the recommendations of the unemployment conference at Washington, a 4-day basis supplanted its regular 6-day basis on Oct. 10.

Cement shipments in September of the Bessemer Limestone & Cement Co., Youngstown, Ohio, totaled about 97,000 bbl., slightly less than the preceding month. An official of the company predicts that October shipments will be about the same as those in September.

Weldability of Low Carbon Steel

While the oxy-autogenous welding process is steadily extending its scope, experience has shown that by no means are all grades of iron and steel suited for it. Writing in a German contemporary, C. Diegel states that certain impurities are having rather deteriorating effects. This refers especially to sulphur and silicon, the percentages of which should be kept as low as possible while carbon should also be below 0.3 per cent. Manganese the author considers to be an advantage; a high percentage of this element is even held to compensate the harmful effects of sulphur and silicon but the raising beyond a certain mark offsets all the initial advantages owing to the fact that sheets having a high

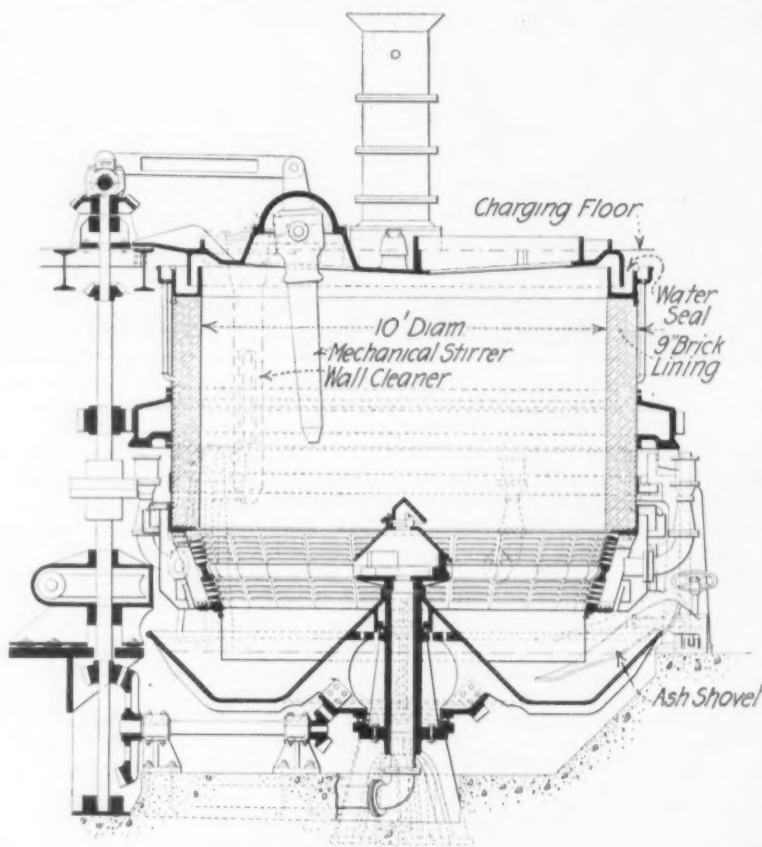
percentage are difficult to work. Phosphorus, a low content of finely distributed aluminum (originating from the reduction) as well as chromium and tungsten originating from scrap, were found to have virtually no influence at all.

The foregoing shows that the material of the pieces to be welded determines the efficiency of the joint, but experiments have proved that the raw material of the wire used for welding plays an even more important rôle. In this connection it is interesting to note that the chemical composition of the wire is by no means always determining the quality of the joint, so that for the time being there appears to be no absolutely reliable

criterion in this respect. In view of this fact the writer recommends trial weldings with subsequent testing of the joint, preferably by the bending test. It would appear that the slag contained in puddled iron has a rather beneficial influence; the wire must furthermore be free from impurities, especially sulphur. Charcoal puddled iron and electric iron are considered the best suited materials for wire.

An 8c. an hour cut in wages has been accepted under protest by the 2000 working members of the Metal Trades Council at Seattle. The men have been receiving 80c. per hr., but complaints of investors in hesitating about undertaking new commitments is not due to the price of iron and steel essentials but to the high wage scale in the trades, which in many instances are still on a war footing. About 200 machinists are affected by the reduction.

Many letters have been received by President James A. Campbell of the Youngstown Sheet & Tube Co., Youngstown, Ohio, one of the four Ohio members of the national unemployment conference, from corporations and individuals pledging their support in helping to solve the problem. According to Mr. Campbell, iron ore producers centering about Duluth are preparing plans for operation of mines.



Section of the New Gas Producer Showing, in Dotted Lines, the New Rotating Wall Cleaner. The blast distributor, with its scores of narrow slots for entering air, appears above the ash pan

Prospects for Foreign Trade in Machine Tools

Experience of Recent Years—Superior Position of the United States Compared with United Kingdom and Other Countries—Favorable Indications

By W. H. RASTALL.*

SUGGESTIONS as to the prospects for foreign trade in machine tools, the strength and trend of foreign competition, and the markets that are now active are provided in the following analysis of the experience of recent years. This industry has been most strongly affected by the war and reconstruction and in America is feeling acutely the depression that has spread over the entire world during recent months while, in contrast to this position, the latest returns indicate that British manufacturers are enjoying a constantly increasing foreign business.

In considering this subject, due allowance must constantly be made for the fluctuations in prices. The abnormal demand during the war raised quotations to high levels, so that the results, as expressed in dollars, do not accurately represent the quantities or tonnage actually shipped. Also variations in exchange confuse the situation where foreign currencies are employed.

The only nation that occupies a position of importance as a competitor in this trade is the United Kingdom, and the superior position of the United States is indicated in the following tables, the first of which

the United States and the steady increase in this volume since 1910 indicate a genuine appreciation of our methods, and it seems probable that a reasonable demand for our tools will persist indefinitely even though the experience of recent months shows a serious reduction in these exports for the time being. On the other hand, there seems to be very little to recommend the British type of equipment as the volume of shipments to the United States is not large enough to be given separate mention in the British returns.

With the foregoing as a brief statement of the position of American equipment in the world machine tool trade and its history during the last decade, with an estimate of its trend and nature during that time, it is desirable to give closer attention to the present situation, for American exports seem to have fallen to very low levels. This, of course, is but an incident of reconstruction, the depression following the feverish business of recent months, and there are signs that we are already beyond the most severe stages of this collapse. The changes in our exports are shown in detail in Table III, it being remembered from Table I that 1920 represents more or less faithfully the experience of the years since 1916.

British experience is in very sharp contrast with this and it seems that the industry there has readjusted itself pretty well and is practically on a peace basis

	*Exports from United Kingdom	†Exports from United States
1909	\$3,734,837	\$3,640,034
1910	3,473,072	5,975,503
1911	3,691,121	9,626,965
1912	4,543,813	12,151,819
1913	4,922,208	16,097,315
1914	4,958,108	14,011,359
1915	3,744,552	28,162,968
1916	5,427,930	61,315,032
1917	10,262,750	84,935,410
1918	6,222,433	51,620,297
1919	‡	58,507,942
1920	‡	44,312,233

*Converted at \$4.86 per pound.
†Fiscal year to 1917—calendar year 1918 and after.
‡Detailed figures not yet received.

shows the volume of the exports from each of these countries and the vast expansion of the business from both during the last few years.

It is scarcely accurate to speak of the above countries as competing in this trade, for as is well known the differences in design are so great as to constitute two distinct classes of equipment. Generally speaking, the British tendency in design is toward "universality," that is to say tools, each of which may perform a variety of services as contrasted with the American tendency toward "specialization," the production of single-purpose machines. To a certain extent, Table I also expresses the comparative demand in the world markets for these two types of equipment, and from the nature of the services rendered, neither could expect to exclude the other, as the single purpose machine is the type suited for manufacturing, while the other type has advantages, for example, in the small repair shop. This is illustrated in another way by Table II, and it will be further noted that this table also emphasizes the pre-eminent position of American manufacturers in the machine tool trade of the entire world, for even before the war the United Kingdom would import machine tools from the United States to a value of from a quarter to a third of her own total exports.

It will be noted that entirely apart from war influences there has been a strong tendency in Great Britain toward the adoption of American style machines. The high percentage that has so long been purchased from

Table II—British Exports and Imports of Machine Tools

	Exports from U. K.	British Imports from All Sources	British Imports from U. S.	Percentage from U. S.
1909	£768,485	£81,155	£68,293	84
1910	714,604	81,978	66,078	81
1911	759,490	214,219	192,863	93
1912	934,941	282,643	260,100	92
1913	1,012,800	361,440	324,832	90
1914	1,020,187	427,049	376,605	88
1915	770,484	2,128,383	2,099,076	99
1916	1,116,858	2,911,746	2,849,281	98
1917	2,111,677	2,654,825	2,616,286	98
1918	1,280,336	3,858,264	3,771,994	98

once more. Data given in the preceding paragraphs indicate the situation there during the earlier years of the decade. The following report of Wilbur J. Page, American Trade Commissioner in London, shows the more recent experience:

"The July returns show a fall in both imports and

Periods: Seven Months January to July	Total Weight, Tons	Total Value, £	Value per Ton, £
Imports of Machine Tools			
1911-14 (pre-war average)....	1,930	187,447	97
1915-18 (war average).....	11,370	1,681,927	148
1919.....	11,120	2,660,040	239
1920.....	8,221	1,805,432	220
1921.....	2,379	532,199	224
Exports of Machine Tools			
1911-14 (pre-war average)....	8,927	543,583	61
1915-18 (war average).....	8,037	771,218	96
1919.....	7,175	1,024,110	143
1920.....	11,675	1,604,639	137
1921.....	14,629	2,124,309	145
Exports of Engineers' Tools, Milling Cutters, Etc.			
1920.....		915,779	
1921.....		611,005	

exports in tonnage and total value, though there is a slight rise in the value per ton. The imported tonnage has been settled at a low level for five running months,

*Chief Industrial Machinery Division, Bureau of Foreign and Domestic Commerce, Washington.

and it seems unlikely that Great Britain will import more machine tools than before the war.

"The usual comparative table shows that on all points the present year is turning out very favorably. The decline in imports is too heavy and prolonged to be regarded as a mere fluctuation. The exports are very much above any previous record in deadweight of machinery—about double the level of 1919—and this high level is the result of a fairly steady increase over two and a half years. It is remarkable that the price of exported machine tools did not rise in step with the general inflation of values, and that the price is now

Table III

	Lathes		Other Machine Tools	
	1920	1921	1920	1921
Jan.	\$631,271	\$818,068	\$816,773	\$1,222,731
Feb.	587,348	442,491	895,675	778,250
Mar.	1,079,793	337,856	1,943,230	528,563
Apr.	560,008	335,614	1,229,819	379,320
May	829,434	269,835	1,318,478	254,326
June	846,583	131,140	1,127,297	267,344
July	542,175	191,983	915,074	281,936
Aug.	414,604	51,569	972,247	209,630
Sept.	506,781		1,176,175	
Oct.	358,088		1,170,075	
Nov.	589,444		1,131,461	
Dec.	629,594		1,264,939	
Total	\$7,575,123		\$13,961,243	
1919	10,136,877		12,490,600	
1918	9,853,507		11,626,360	

	Sharpening and Grinding Machinery		Other Metal Working Machinery	
	1920	1921	1920	1921
Jan.	\$394,374	\$296,385	\$1,611,528	\$1,956,879
Feb.	261,209	148,210	2,024,929	1,412,630
Mar.	475,248	95,645	1,652,604	1,359,489
Apr.	334,269	84,946	1,489,625	1,255,542
May	276,057	82,183	1,919,421	669,627
June	395,903	60,499	1,134,940	1,029,230
July	396,246	105,293	1,823,097	1,155,283
Aug.	278,864	61,711	1,242,778	608,653
Sept.	333,844		1,190,343	
Oct.	247,788		1,556,908	
Nov.	237,395		1,373,323	
Dec.	314,293		1,557,881	
Total	\$3,945,490		\$18,830,377	
1918	5,494,060		30,386,405	
1919	6,161,876		23,978,554	

being maintained against the general falling tendency; also that this comparative steadiness of value is accompanied by an increasing trade."

Returns showing the countries to which this equipment has been shipped have not yet been received, but so far as may be judged from American and earlier experience, the heaviest demands are from Europe. It is not at all certain that it is good policy to concentrate too strongly on these markets because of the abnormal conditions. The demand there for American type of equipment seems to have fallen to very low levels and it may be anticipated that British manufacturers will soon feel the same influences or else there will be a revival here.

The markets of Asia rank next in importance and Japan, British India, China, the Dutch East Indies and some of the smaller markets show signs of absorbing an increasing quantity of our equipment. Asia is being industrialized far more rapidly than many of us realize. The next group in order of importance is that including Cuba, Mexico and South America, and although these countries are having serious financial problems, their markets deserve careful attention. The business from even the smallest countries as, for instance, in Central America, is increasing nicely. Australia, New Zealand, and the various countries in Africa give similar promise.

Plans are being considered at Youngstown, Ohio, whereby private interests may finance and erect a locomotive repair plant for the Erie Railroad, similar to that operated at Marion, Ohio. Officials report that the Erie is much in need of additional repair facilities for its locomotives and that Youngstown is among the most important freight centers which it taps. The Erie has assured interested parties that sufficient repair work would be given such a plant to keep it in steady operation.

Walter Sanborn on Industrial Conditions

G. Walter Sanborn, purchasing agent of the United Engineering & Foundry Co., Pittsburgh, and president of the Purchasing Agents' Association of Pittsburgh, made some timely observations anent present day economic and industrial conditions, in a talk at the Pittsburgh Chamber of Commerce on Oct. 4. He laid special emphasis upon the necessity of lower freight rates as a means toward a healthy recovery in business. "Business can't go along in a healthy condition until freight rates are reduced," Mr. Sanborn said, "and until we have a further liquidation on certain basic commodities and wages. Thus far the 12½ per cent reduction in railroad wages is entirely inadequate to place railroads in a position where they can meet the just demands of shippers for lower rates. The wage-earner claims he can accept no decrease in wages until living costs come down. Wages must follow instead of lead decline in cost of living, for so long as the workman has abundance to live on, just so long will he pay any price for necessities of life.

"The slogan from the Government down is 'practice economy.' Our Government could do far more for the unemployed by fighting the high transportation rates than by merely talking over unemployment. Reduction in excessive freight rates will mean more business activity and more business means more work for the unemployed. The Government is urging economy, which means curtailed production of necessities, and on the other hand is urging industry to employ labor, which is impossible under the forced policy of retrenchment and curtailed operation. It is like a dog chasing his tail in a circle.

"We now have indications of more business activity. We hear that if it wasn't for the buyers' strike we would have a healthy condition. Don't misconstrue this as meaning the purchasing agent precipitated the depression. Such is not the case. This period of readjustment had to come. It is a natural condition in the business circle.

"Purchasing agents are like a lot of sheep. Once the trend changes they switch from heavy buying to drastic curtailment. The successful purchasing agent must be a keen student of economics in order to exercise good judgment as to fluctuating markets. A friendly man-to-man transaction will accomplish greater results than a disgruntled, antagonistic discourse. Salesmen often are in a position to tip off the buyer to contemplated changes in market conditions and the salesman isn't going to hand such tips to the hard-shell crab."

Advantages of Consolidation

YOUNGSTOWN, OHIO, Oct. 11.—Commenting on reports of a proposed consolidation of independent iron and steel producers, which have periodically appeared within the past five years, an independent executive in the Mahoning Valley states that such an amalgamation is possible. "In fact, it seems the only logical thing for the independents to do, in order successfully to compete with the Steel Corporation. A strong consolidation, with plants in the East and West, would permit operation on a competitive basis with the leading interest, and would reduce operating, sales and executive expenses to a minimum. Mahoning Valley plants would unquestionably form the nucleus for such a merger."

The Youngstown Sheet & Tube Co., Youngstown, Ohio, which has contracted to supply the Mattie furnace at Girard, Ohio, of the A. M. Byers Co., Pittsburgh, with 60,000 tons of coke, has added a fourth battery of by-product coke ovens to the active list. Delivery of the coke is to cover a period of four months. The price is reported to net the producer approximately \$5 at its ovens, which figures back to \$3.12½ Connellsville. The Sheet & Tube company is also supplying coke for Mary furnace at Lowellville of the Sharon Steel Hoop Co., Sharon, Pa., in addition to two of its own furnaces in the East Youngstown group.

Cutting Cast Iron by Oxyacetylene Torch

A 5-ton cast iron propeller hub was recently successfully cut in half with an oxyacetylene torch. The thickness of the casting ranged from 7 to 10 in. Two cuts were made, each 40 in. long. No attempt was made to clean the casting, although it had been lying in the open for months and was covered with rust. Nor did the operator preheat the hub preparatory to cutting. The photographs reproduced herewith show how the job looked after successful completion. The work was performed at the shop of a large manufacturer of propellers, as a test of the cast iron cutting qualities of the torch.

The cost of cutting cast iron with the oxyacetylene torch is about five times that of steel, and, in this connection, the following data prepared by A. S. Kinsey, professor of shop practice, Stevens Institute of Tech-



How Oxyacetylene Cuts of a Cast-Iron Propeller Hub
Looked, Thickness Being 7 to 10 In.

nology, and advisory service engineer of the Air Reduction Sales Co., will be of interest.

"Steel 12 in. thick can be cut with oxygen and acetylene at the rate of about 30 sq. in. per min., costing, say, 1.5c. for labor, 10c. for oxygen and 2c. for acetylene, a total of 13.5c. to cut 30 sq. in. per min.

"Twelve inch cast iron" (used in Professor Kinsey's experiments) "was cut at the rate of 7 sq. in. per min., costing 1.5c. for labor, 13c. for oxygen and 4c. for acetylene, a total of 18.5c. to cut 7 sq. in. per min.

"We may therefore calculate the following approximate figures on a basis of 100 sq. in. of metal cut:

To Cut by Hand Torch 100 Sq. In. of Cast Iron and Steel with Oxygen and Acetylene

Material	Time, Min.	Consumption		Cost			
		Oxy- gen, Cu. Ft.	Acety- lene, Cu. Ft.	Time	Oxy- gen	Acety- lene	Total
Cast iron 15	123	21		\$2.22	\$1.84	\$5.56	\$2.62
Steel ... 3.5	25	2		.06	.37	.05	.48

"While the above figures show the relative cost of cutting cast iron and steel with the oxyacetylene torch to be high for cast iron, it is fair to note that the only other way to cut cast iron, i.e., by machinery, would cost at least twice as much as cutting it with the torch. For example, a slab of cast iron costing \$2.62 per 100 sq. in. to cut off with the torch would cost if cut by machinery at least \$5 for labor and power if the casting were of convenient size to handle. However, the cost might be double that amount for machining a big, unwieldy casting."

Fay & Scott, Dexter, Me., lathe manufacturers, started Oct. 3 on full time, a 52-hr. week. This is the first time for nine months that this concern has operated on full time. With the slight upward trend in business it hopes to maintain this schedule with its present crew of approximately 100 men, representing one-fourth of the normal crew.

Hearings on Metric System Bill

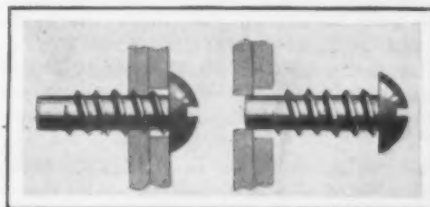
WASHINGTON, Oct. 11.—Hearings on the Ladd metric system bill are scheduled to begin to-day before a subcommittee of the Senate Committee on Manufactures, consisting of Senator McNary, of Oregon, chairman; Senator Weller of Maryland and Senator Jones of New Mexico. The first witnesses to appear will give testimony in support of the measure. Among those listed to present this side of the case are Dr. Harvey W. Wiley, former chief of the Bureau of Chemistry; Dr. Charles L. Parsons, secretary of the American Chemical Society; Howard Richards, Jr., secretary of the American Metric Association; S. L. Hilton, president of the American Pharmaceutical Association; William J. Scheffelin, a drug manufacturer of New York and Theodore H. Miller of the De Laval Separator Co. The names of those to appear in opposition to the measure have not been announced and it is not expected that they will be heard this week, but will be given an opportunity to be heard later. The bill provides for the compulsory adoption of the metric system throughout the country after 10 years.

Tapping Operation Eliminated in Assembly of Die-Cast Parts.

A novel design of screw for use in assembling die-cast parts, recently put on the market, requires no tapping of the hole in which it is inserted. It has a V-thread of fairly steep pitch, and a cylindrical point or pilot, which steadies the thread while it is seating itself in the metal.

A hole is first drilled in the piece which would ordinarily be tapped, a few thousandths larger than the cylindrical pilot, and the piece to be fastened to it is drilled for clearance over the threads. The pilot is inserted in the hole, and by a few turns with a screwdriver the screw is driven to its seat. The screw is hardened and heat-treated, so that the thread cuts into the metal like a tap.

It is claimed for this screw that it will cut its own thread in die-cast or sand-cast parts of gray iron or softer metals, and that its use in such metals will not injure the thread. Its special advantage lies in the



Screw for Assembling Metal Parts Without Requiring Tapping of Hole

fact that it eliminates tapping and skilled labor. It is manufactured by the Parker Supply Co., Inc., New York.

The Todd Shipyards Corporation, New York, has begun work on the reconditioning of the steamer St. Louis for the Anderson Overseas Corporation. Five hundred men were started on the task of making the liner ready, early in January, for the world trade cruise. The actual cost of the conditioning of the vessel has not been stated, but it is reported to be around \$1,000,000. Work on the St. Louis will be done at the Robins Dry Dock & Repair Co.'s plant, in Erie Basin. The contract calls for completion shortly after the first of the year, when the steamer will be prepared to carry the exhibits of 300 to 350 American manufacturers on a world voyage lasting until December, 1922. The St. Louis will be converted into an oil burner and will be equipped with every modern device known for the comfort and safety of her passengers.

The new reheating furnace at the steel plant of the Dominion Steel Corp., Sydney, N. S., is now in operation. The installation, which cost \$125,000, was completed in 12 weeks. Double shifts were used in the construction work, for the furnace was required quickly in order to complete a large rail order.

Alleviating Industrial Instability

Keynote of Fall Convention Last Week
at Springfield, Mass., of Society of
Industrial Engineers—Government Efforts

OUTLINING the present industrial depression and contrasting it with the prosperity of a relatively short time ago, pointing out the regularity of such cycles, L. W. Wallace, executive secretary American Engineering Council, in his address opening the fall convention of the Society of Industrial Engineers, of which he is president, sounded the keynote in invoking thought and discussion on industrial instability. He directed attention not only to the recurring cyclic instability but also to that which is always present, saying in part, "It would be most unfortunate if no consideration were given to methods to be invoked constantly in order to reduce the great amount of seasonal fluctuation that is always present. The great seasonal fluctuations in some of our industries are not recognized and their evils not appreciated. In the correction, or at least the material reduction of this evil lies a large possibility for materially lessening the disastrous results of the more general and far-reaching lapse of activity that comes in fairly regular cycles." Mr. Wallace advocated a mental attitude of courage on the part of both the leaders of industry and the workers, saying that during a decline there is often a retreat rather than a fight, an attitude which results in a more rapid decline and is therefore a marked influence in industrial instability. He gave as the consensus of opinion that some of the fundamental reasons for depressions are fluctuations in the purchasing power of the dollar and the many misrepresentations that follow, and also gross expansion of currency and credit.

Other factors contributing to the same end, while not so far-reaching, yet more apparent and tangible, are the many practices and policies of long standing in industry, disclosed in the waste report of the Federated American Engineering Societies. Among these, speculation in raw material, faulty and extravagant sales policies, lack of standardization and more thoroughness in illness and accident prevention, were emphasized. Foreign trade he said is an important factor in stabilizing our industries, although we cannot get our share of this trade, he added, without giving quality and service.

The convention which was held in the Auditorium, Springfield, Mass., Oct. 5, 6 and 7, brought out numerous viewpoints which were intended through better methods of manufacturing, selling, accounting and better industrial relations to contribute in some degree to the solution of the problem of industrial instability.

Efforts of Department of Commerce

F. M. Feiker, assistant to Secretary of Commerce Hoover, in his address on the subject of industrial instability said that the first step in an attempted solution is to devise a plan for getting at facts. He called attention to the weather report as the most widely read, the shortest and most complete report issued by the Government. "What every business man of the country is waiting for," he continued, "is someone to give him at about the same length and with the same authority a statement with regard to business. Similar reports giving in three or four lines 'a picture of business conditions of the fair and warmer variety,' appearing in every newspaper, would," he said, "tend largely to iron out the peaks and fill up the valleys in the ups and downs of our business life."

Regarding the usual attitude toward industrial instability Mr. Feiker said in part: "Few of us get down to brass tacks. We hate to talk about gloomy things. If the steel companies know five months ahead that there is going to be a depression, we do not know it. As Americans we like to think that everything is coming out all right, and therefore when we see the wolf, instead of facing it and trying to hold it up, we just

talk about how good business is going to be, instead of taking the experience of the past and making that a background for our action." Mr. Feiker referred to the monthly publication of the Department of Commerce, *Survey of Current Business*, as a step in the direction of presenting statistics in a form to indicate trend of business. In the intimate use of statistics, however, he pointed out, consideration of local conditions as well as the general national situation is needed and there is a wide opportunity for the further localization of statistics as a factor in stabilization.

In speaking of elimination of waste as a factor in stability, he said that in the manufacturing industries it involves standardization of dimension and elimination of variety. The Department of Commerce it appears is working out a systematic plan of co-operation between the industries and the Bureau of Standards. He named co-operation as the final factor in the stabilization of industry.

Synchronizing Sales and Production

A topic that evoked a great deal of interest was that of the synchronization of sales and production. It was discussed at an informal dinner meeting of the sales and production groups under the chairmanship of W. G. Sheehan, Crystal Washing Machine Co., Detroit. That more sales were lost due to a lack of consistency than to any one thing was a view expressed by Myron E. Ream, industrial engineer, Leffingwell-Ream Co., Chicago. He said that in general there is too much material in the product and pointed out that on the whole management had been neglected in sales, due perhaps to the fact that selling has long been regarded as an art and not subject to scientific method. Gilbert V. White, Chalmers Knitting Co., Amsterdam, N. Y., speaking for the production end stressed the idea of frequent meetings between sales and production departments as leading to the synchronizing of minds that is likely to effect the desirable co-operation.

An interesting viewpoint was given by Ralph Barstow, sales manager, Greenfield Tap & Die Corporation, Springfield, Mass., who said that in his company the sales department was regarded as a customer of the production department, and that the latter had its requirements determined by the investigations of the sales department. The sales department he said is active in investigating new markets and in bringing in new ideas. He argued for a sales representative on the production force to act as liaison officer. Forecasts as to requirements are made on a three months' basis rather than longer he said, both production and sales quotas being revised as often as changed conditions make necessary. Col. Benjamin A. Franklin, vice-president Strathmore Paper Co., Mittineague, Mass., acted as judge and in commenting on the discussion, said that there was need for selection and training of salesmen, stating that too many men merely drift into selling. He pointed out that the two departments should feel a mutual responsibility to each other. Quality, volume, delivery and economy of price was the responsibility of production to sales department; and specification as to goods and volume was the responsibility of sales to the production department.

Scientific territorial analysis as the basis of quotas to individual salesmen was advocated by E. St. Elmo Lewis, New York, in his paper "Setting Sales Standards" given at an Auditorium meeting, of which Benjamin A. Franklin was chairman. An address by F. L. Willis, sales manager Lewis A. Crossett Co., North Abington, Mass., on "Securing the Factory's Co-operation on Quality and Delivery," analyzed the weaknesses in the points of contact between the sales and factory departments. Making the sale, he said, is only

one step in the problem of marketing; we still have the problem of maintaining the good will of the buyer. Quality below standard, delay in delivery, broken or short shipments cause dissatisfaction.

Every sales department, Mr. Willis said, should know at all times what materials are being used and how they compare with previous standards. Mistakes and undue promises are frequently due to the sales department not understanding the limitations of the factory. In connection with the effect of delayed delivery on sales effort, he said that a salesman who is not told by his house when goods can be delivered is at a serious disadvantage. He advocated discussion by department heads of problems arising in production and selling and advocated also intelligent, exact and impartial inspection for control of quality details. In conclusion he said that "industry in this country spends vast sums in merchandising, advertising and sales promotion of its various products. A large part of this is wasted because of a lack of thorough knowledge of what sales promises can be made safely and a lack of effort to see that every individual understands and carries out his part in fulfilling agreements."

Arthur T. Davenport, general manager, Sweet, Orr & Co., New York, at an Auditorium meeting of which Dr. Ira N. Hollis, president of the Worcester Polytechnic Institute, Worcester, Mass., was chairman, addressed the convention on "The Importance to the Factory of Constant Output." Mr. Davenport argued for planning and co-ordination between the production and distributing agencies and indicated the need for engineering method in distribution and advertising. He said that our present selling methods were wasteful and advocated that idle time of salesmen, which he said was very great, be spent investigating extension of the market.

Salary Standardization

A paper that evoked a great deal of interest was that on "Salary Standardization as an Aid to Industrial Stability" read by H. A. Hopf, industrial engineer and organization counsel Federal Reserve Bank of New York. It dealt specifically with the standardization of the salaries of administrative employees, "the white collar brigade," as Mr. Hopf expressed it. "Some more systematic and scientific way of handling office workers is needed, with definition of jobs, a definition of duties and rating according to performance, standardization of salaries and assurance of continuous employment for faithful service," he said. "The question of wage as an incentive," he continued, "has been handled far from properly. There has been no attempt to relate wage to job and in a great many instances executives have deliberately ducked this troublesome problem." Unless there is fairness, quality and uniformity, he declared, there will be no chance to offer a financial incentive. He reviewed conditions as they exist in many business establishments where there is a large administrative force, pointing out how, by standardizing the wage justice is done the employee, and the employer may know with greater accuracy what his salary costs will be. During his talk Mr. Hopf showed slides illustrating by various charts and curves, methods used in standardizing administrative salaries.

White Paint to Reduce Fatigue

A luncheon meeting of the Committee on the Elimination of Unnecessary Fatigue, with Dr. Frank B. Gilbreth, consulting engineer, Montclair, N. J., as chairman, considered the subject of "White Paint as a Reducer of Unnecessary Fatigue." Mr. Gilbreth exhibited photographs showing a tool room so treated, and in this connection said: "White paint not only reduces accidents, and fatigue in general, through reducing eye fatigue, but it directly increases visual acuity. The more general use of white paint as illustrated by this tool room may some day be extended even to stairways in factories, where a much larger proportion of people are killed yearly than of passengers on railways."

A progress report of certain activities of the committee was given by its chairman and the announcement that A. Russell Bond, of the Federated Engineers Development Corporation had recently accepted the sec-

retaryship of the committee was made. A paper on the "Pioneer Work of George F. Blessing in Fatigue Elimination in the Colleges," by Frank B. and L. M. Gilbreth, was read by Mr. Bond. Brief discussion followed on the various phases of fatigue elimination and the use of white paint as one of the standards connected therewith.

Phases of Standardization

The problem of eliminating waste in industry by standardization was discussed in three particulars at an afternoon Auditorium meeting, the chairman of which was Lee Galloway, vice-president Ronald Press Co., New York. Dr. H. C. Emerson, Emerson Laboratories, Springfield, Mass., in his paper on "Material Standardization" pointed out the place of the chemist in standardizing raw material and finished product and also in the development of standards by research. E. E. Hunt, Washington, D. C., secretary of the National Unemployment Conference and member of the Committee on Elimination of Waste in Industry, asked Dr. Emerson what industry had advanced most in research work. He referred the matter to Miss J. E. Minor, one of his associates, who said that it was her impression that in the matter of research the steel industry had gone further than any other.

Machine standardization was taken up in a paper on the subject by L. P. Alford, editor *Management Engineering*. Standardization, he cautioned, is not a rigid fixing of something that cannot be changed; "it does not carry the idea of the ultimate, but of progress—a progressive standard." Standardization of machinery, he said, includes the items of proportionality, direction of certain motions, and standardization of elementary times. Of the latter he remarked that the buyer should be given an instruction card giving time and motion study of its elementary operations, showing the opportunity for production from a given machine. Controls, he said, such as hand wheels and pilot wheels, if standardized, would bring about important advantages.

Dr. Gilbreth dealt comprehensively with standardization of the task in his paper on that subject. Any one class of standardization affects every other, he stated. For best results "the machines, the materials and the decisions and motions relating to the human element must be considered in the greatest detail. Failure to consider all classes along such broad lines, he said, has been the reason for failure of many attempts at standardization. "No task," he pointed out, "can be set properly unless all features and conditions beyond the control of the individual are controlled within reasonable tolerances for him." The task must be achievable. Another principle emphasized by Dr. Gilbreth was that "the extra high pay or bonus paid for the accomplishment of a task must come in the final analysis, from the savings that result, or again the whole plan of task management will fail." All three phases of the subject of standardization brought out considerable discussion.

Banquet Closes Convention

At the informal banquet which closed the convention, held at the Hotel Kimball, Reuben A. Lundquist, chief of electrical division, Department of Commerce, Washington, addressed the members on "The Influence of Foreign Trade Upon Industrial Stability." "It has been pointed out by Mr. Hoover," he said, "that while the exports of the United States are not a great percentage of our total production, 25 per cent of our wheat, 60 per cent of our cotton and 75 per cent of our copper and an important percentage of other commodities go abroad. These exports are the normal surplus production of such commodities which must find a market overseas in order that the West and South may prosper." Mr. Lundquist then pointed out that the prosperity of those sections doing an export trade results in trade opportunities for other sections that are not exporting, in supplying the former's needs. In that way an indirect influence for stabilization of industry is effected.

In connection with the direct results of export trade as a stabilizer, he said: "Two years ago a little over 50

per cent of the motorcycles went abroad. Last year the percentage was 55 and that in the face of a decreasing domestic demand."

E. E. Hunt described the preliminary work in the organizing of the National Unemployment Conference, and Floyd W. Parsons of the *Saturday Evening Post*, Philadelphia, outlined in general the status of scientific development, saying that "the foundation of industrial stability is the intelligent understanding and practical application of science in business."

Attendance and Plant Visits

There were 318 registrations at the convention. Besides general meetings, sectional luncheon and dinner meetings were held. Active interchange of experience was as usual a feature of the intervals between sessions. The mornings of each day were devoted to plant inspection trips, among which were National Equipment Co., American Bosch Magneto Corporation, Rolls-

Royce of America, Inc., Hendee Mfg. Co., Moore Drop Forging Co., all of Springfield, Mass., and Gilbert & Barker Mfg. Co., West Springfield, and the Greenfield Tap & Die Corporation, Greenfield, Mass. An exhibition of organization charts, standardization charts, charts of course and control of manufacture, etc., was made by various industrial engineering companies in the lobby of the auditorium.

New President and Secretary

At a meeting of the board of directors Joseph W. Roe, professor of industrial engineering, New York University, was elected to take the place of L. W. Wallace as president of the society. W. G. Sheehan, vice-president, Crystal Washing Machine Co., Detroit, was elected secretary in place of Edward L. Ryerson, Jr., Joseph T. Ryerson & Son, Chicago.

The place and subject of the next national conference of the society have not as yet been determined.

HIGHER SHEET PRICES

Buyers Notified That an Advance of \$5 Will Be Made Oct. 15—Plates for Tank Car Interests

YOUNGSTOWN, OHIO, Oct. 11.—Independent sheet interests throughout the Middle West are notifying their customers that prices on all grades of sheets will be uniformly advanced \$5 per ton on Oct. 15, establishing the new prices at 2.75c. for No. 10 gage blue annealed, 3.25c. for black and 4.25c. for galvanized. The principal producers are joining in this action, contending that sheet production costs have heretofore been in excess of prices. Tonnage placed with such makers prior to Oct. 15 will be accepted at the current levels of 2.50c., 3c. and 4c. for the respective grades. It is considered unlikely that this advance will force the volume of business to the mills which preceded the previous increase. Substantial sheet orders are being booked, however, and though makers have been cautious in accepting future commitments, a number of interests are scheduled ahead well into November and in some cases beyond.

Buying by jobbing interests is an important factor in the current movement, aiding to offset in some measure loss from automobile builders. The Ford Motor Co., for instance, due to its reduced schedules at Detroit, has held up specifications against both sheet and strip contracts.

Inquiries for Plates

Inquiries for plates during the past week before district interests aggregated in excess of 10,000 tons, principally from tank car interests. One such concern in the Shenango Valley, for instance, has been inquiring for 2500 tons of plates. An oil distributing agency at Youngstown has placed an order with the Standard Tank Car Co., Sharon, Pa., for a number of tanks for lubricating oil storage whose capacity will aggregate 120,000 gal.

Though the independent plate market is still somewhat difficult to gage, there is full expectation among this class of producers that quotations will be shortly advanced \$2 per ton.

An advance in sheet bars from \$32 to \$34 and possibly \$35 is almost certain to follow higher sheet prices, inasmuch as self-contained sheet interests are not likely to give non-integrated makers any advantage in costs. The previous sheet price increase was followed by an advance in open-hearth sheet bars from \$30 to \$32, affecting other semi-finished products in a proportionate measure.

The full-finished sheet market continues at 4.35c. for No. 22 gage auto body stock, in face of reduced demand.

More Demand for Strips

The week has witnessed an upward turn in strip steel placements, affecting both hot and cold-rolled, but this market is not affected by the sustained buying

which has prevailed in sheets, for instance. One Valley strip interest has completed rolling 1000 tons of hot strip, including several "sample" orders. Among the orders rolled were 350 tons for a tube interest in Michigan, a tonnage for a fabricator at Youngstown, material for Dodge Bros., auto makers, and a number of small miscellaneous requirements.

A recent heavy sheet order rolled by a Valley mill included a substantial tonnage for conversion into running-boards for Ford cars.

Various independent sheet makers claim that a careful survey throughout mid-West mills reveals that production costs on common sheets range from 3.10c. to 3.40c. with various interests. They point to their inability to continue long to sell black sheets at 2.75c. or even 3c. on such a cost basis.

As a general rule, September bookings in virtually all steel lines, especially the lighter products, exceeded business placed in August, which marked a definite turn for the better in this district. Whether October will maintain this rate of inflow is questioned in some quarters.

Steel Pipe Stronger

Standard steel pipe has shown more strength since the recent attempt to stabilize the market, but all producers are evidently not subscribing to the new discounts owing to claims of price considerations advanced by some buyers. The smaller sizes continue in more active demand, while moderate requirements for line pipe continue to come to the mills.

Inquiry for tinplate for 1922 delivery has made its appearance and district producers believe that next year will prove much more favorable in this branch of the industry.

The buying movement in scrap metals appears to be losing ground, though the aggregate tonnage purchased the past month represents an increase over the combined purchases during several of the summer months. Heavy melting is nominal at \$14 to \$14.50, while hydraulically compressed scrap is quoted from \$13 to \$13.50. Minimums rule on going business.

Prime Western spelter has been purchased at 4.50c., f.o.b. St. Louis, as compared with a recent low of 4.10c. Consumers in this territory have been buying more or less freely in anticipation of continued demand for galvanized sheets.

Due to absence of demand from the railroads and agricultural implement makers, demand for steel bars continues exceptionally light. The price range on cold strip is from 3.75c. to 4.25c., with the minimum price easily obtainable on certain classes of tonnage, while hot strip ranges from 2c. to 2.25c.

It is significant that tonnage is not coming into the mills in proportion to current shipments, especially in sheets and wire products. Specifications on standard pipe continue at 40 per cent. Tin plate is unchanged at \$5.25 for production plate, though some current production is reported to be going into makers' warehouses. Skelp is more active and rules at 1.60c. base, Pittsburgh.

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ESTABLISHED 1855

THE IRON AGE

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Freight Rate Reductions

It is much easier to assert that the transaction of business is interfered with by the existence of a given condition than it is to produce revival in business by removing that condition. In many quarters the opinion has been expressed that freight rates ought to be reduced in the interest of revival in business, and the opinion is well supported by the argument that practically everything else has been liquidated, so why not freight rates? That is different from predicting that a revival in business would immediately follow a reduction in rates. Since business began to fall off last year we have had from time to time various lists of the things that were needed to put business on a firm foundation. Not a few of these things have been granted, without business responding.

The announcement that iron ore rates are being reduced by 28 per cent—which is the arithmetical converse of the 40 per cent advance in August of last year—and that other reductions are to follow, will certainly not have the effect of stimulating business. Rather it may encourage buyers to wait for those reductions that will benefit them. It may, and probably will, cause more active planning, so that the benefits when offered can be reaped. Pig iron producers will not reduce their selling prices by reason of ore rates being reduced, one reason being that they have large piles of ore, which are not affected, while another reason is that they feel they need all they can get, the declines in pig iron earlier in the year having in a measure anticipated rate reductions. As to an actual reduction in the cost of producing pig iron, reductions in coal and coke freight rates would be much more to the point, since day by day by-product ovens are receiving coal and blast furnaces are receiving coke.

Even if rates on all blast furnace materials, ore, coke and limestone, were reduced, the pig iron consumer would have something more to ask. He pays freight on pig iron, and has been counting on the rates being reduced. He may even feel that he is entitled to reduced rates on his finished products.

The sooner the rate structure is put on a level from which substantial further reductions need

not be expected the better it will be for business. Stability is all important.

The railroads are not in position to make large reductions in freight rates in general, though on coarse freight it is conceded that the injustice of last year's 40 per cent increase should be righted. Too much stress has been laid on the recent increase in earnings, for the rate is not yet satisfactory and the roads have a large deficiency to make up. In the first six months of this year the earnings were at the rate of only 1.8 per cent. July showed a rate of 4.5 per cent, but that involved a deficiency of 1.5 per cent, to be added to the deficiency of the first six months. It is quite impossible for the earnings in the remainder of the year to make up any large part of the deficiency. For the seven months through July the average was 2.2 per cent a year, so that at best there will be a large deficiency for the year.

The volume of freight movement has not been as small as might be inferred from the claims made in so many quarters that industrial activity is impeded by the high rates. The last three months for which statistics are available, May, June and July, each showed a freight ton-mileage of more than 28 billions, representing a rate well above that in any year prior to 1916 and only 25 per cent below that in the record year, which was 1920.

Coal Out of Line

The fact that the bituminous wage scales with the United Mine Workers run to April 1, 1922, seems to discourage discussion of the subject of coal prices in connection with the readjustment in industry. The scales are extremely high and it seems to be inferred that as a matter of course they will be adjusted at the next biennial settlement. For a time there was some expectation that on account of the altogether unusual condition a mutual agreement would be reached reopening the subject. For this there was sufficient precedent in the upward revisions that were made last year, after the scales had been settled for two years from April 1, 1920. If the matter could be opened for the benefit of the miners, why not for the benefit of the public?

It is altogether idle to assume that as a mat-

ter of course the bituminous wage scales will be revised to a harmonious relation with the general wage level of industry. On the contrary, there are plain evidences that the United Mine Workers intend to hold out for a full renewal of the existing scales, irrational as they are. Report has it that the present plan is to demand an advance and bring on a strike. It is even rumored that a deal is being arranged between the miners and the railroad brotherhoods whereby the latter will endeavor to help the miners by refusing to fire or haul non-union coal.

The high cost of coal is undoubtedly a great impediment to industry. If cost has anything to do with consumption, and that is an accepted argument as to most commodities and as to freight rates, the high cost of union bituminous coal is certainly a great drag upon industry. The price of coal f.o.b. mine is a serious concern to the whole public, as an economic matter, while it is of direct concern to practically every one, for all are consumers of coal. There is no other article of commerce whose cost is so widely felt. Nor is this a cost that is important in percentage and not in dollars, for a dollar a ton on coal is, on an average, more than half a billion dollars a year in the nation's coal bill.

The cost of non-union coal at the present time is much below the cost of union coal, and yet wages in the non-union fields are high as compared with pre-war rates. When made into coke the cost to the consumer is not particularly high. Thus Connellsville coke, made with wage rates that compare favorably with wages in the industries generally, has been quotable lately at \$3.25 per net ton. That is hardly an inflated price. It has been customary of late to take 1913 average prices as a basis for measuring present levels. In its annual summary the Connellsville *Courier* set the average value of merchant coke shipped by the Connellsville region in 1913 at \$2.95, only a small percentage of this being foundry grade. The present price is only about 10 per cent higher. The average in the ten years, 1904 to 1913 inclusive, was \$2.22, and \$3.25 is only 47 per cent above that.

Union bituminous coal can make no such comparisons. One may compare coal prices if he likes or he may consider simply the altogether uneconomical conditions under which coal is mined, with miners expecting to make a living by working very much less than full time. At present the ambition of the union miners seems to be to charge the public, after April 1, 1922, with back pay for the time they have been idle of late as well as the time they may lose in a strike. This is a matter of the greatest concern to the public.

Leaders in the British iron and allied trades have taken a pessimistic view on other occasions of the outlook for industry in their country, but it is doubtful if they have been more depressed at any previous time than they are to-day over business and political conditions. From published expressions and from what is imparted to Americans visiting the British Isles, many manufacturers there see no way out. Trade is in a low state and unem-

ployment is general, while the workers are in a defiant mood, refusing to co-operate either with employers or with the Government in finding and applying remedies for the situation. Many continue to choose to take "doles" from the Government rather than work, even at a considerably larger wage. Some slight reductions in iron and steel wages have resulted from recent conferences based on sliding scale agreements, but fuel costs beyond reason and wage scales generally two and a half times those prevailing before the war leave British works still exposed to severe competition not only from Germany, but from Belgium and France. Recently the filling up of German order books seemed to promise relief, but at best it can be but temporary.

The Washington Conference

Naturally the largest results of the unemployment conference will be in the emergency measures it causes to be set on foot throughout the country to increase the number of the employed. It is encouraging to find that mayors' emergency committees have been created and are actively at work in 31 cities and that eight cities have taken steps for the immediate prosecution of local public work and for the advancement of construction. Unquestionably the conference has done much also to avert the sagging of industry on the verge of winter. There had been many predictions of a winter crisis, and the prevalent view that real improvement—the beginning of a period of profitable employment in industry—cannot be looked for before the spring of 1922 had begotten an expectation that the situation would drift, with little or no concerted effort apart from that directed to the relief of suffering. That feeling the conference has definitely changed.

One accomplishment of the conference that was not set down among the agenda, and that therefore may be reckoned as a by-product, is setting before the people projects for the general good in the carrying out of which they can unite their effort and drop their differences. It was high time the nation had something put before it on which the people could make common cause. For nearly three years now, or almost from the day of the armistice, the changes have been rung on things about which opinions and interests are divided. The rent profiteers; the retailer profiteers; the grudging workers whose performance has been far out of proportion to their pay; the employers who, according to the heated charges of labor leaders, were combining to destroy unions and put down wages; the friends and foes of the League of Nations who were reciprocally accused as responsible for world-wide stagnation in industry—all have been arraigned in the flood of charge and countercharge. The Hoover conference, for the first time since the splendid effort in the Liberty Loan campaigns, has given the whole people an opportunity to pull together for the common welfare.

Another important result already achieved is in furnishing evidence that the unemployment situation was not as grave as some reports, and commonly accepted reports, had indicated. With-

out taking on the aspects of the sunshine movements of other periods of depression, the conference has given business a measure of assurance it did not have hitherto, and impressed upon leaders in all industries a sense of responsibility that in some cases has not been as much in evidence as it should have been.

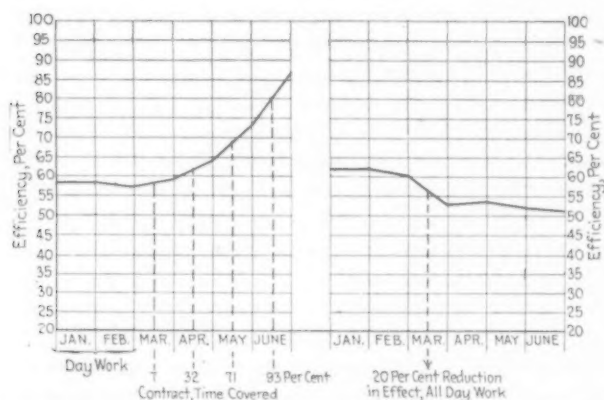
It may have been too much to expect that subjects on which differences would develop would be kept out of the sub-committee sessions dealing with the causes of present unemployment and with more slowly working remedies. Secretary Hoover sought to prevent the wage question from taking a leading place in the discussions. Comment on some developments in this connection may well be deferred until final action is taken within the coming week. Whatever the outcome on these larger questions of permanent policy, it can be said now that the conference was carried through, as it was conceived, on the high plane of service to the community, and already has taken its place as a constructive force of large possibilities.

CORRESPONDENCE

Effect of Hourly Rate Reductions

To the Editor: Reducing wages to decrease the cost of production is just as far wrong as demanding more wages and less hours. With no standards as a basis to work from, one does not know whether he has reduced costs by decreasing the payroll, unless he also knows that production is the same as before.

Some firms with a system can say "we have our standards," and can reduce the hourly wage rate 20 per cent and insist that the flow of production remains the



Comparative Effects of Different Methods of Cutting Costs

same; but the majority of manufacturers have nothing to work from except the payroll, expenditures for material and receipts for finished product. They know the payroll has been reduced 20 per cent, but don't know what percentage of saving was effected by making the wage reduction.

It has been proved that it is not necessary to reduce wages to decrease costs. The better way is to increase the efficiency of the plant by installing standards, and to pay the producer according to his efficiency. Then, if a man earns \$10 in 8 hr., no one can say his wages are too high, as it is not alone the length of time he works but what he produces in that time.

No workman's wages were ever too high if the standards are correct. We cannot get away from the "law of compensation" and run a business from its own momentum. The elements of power to keep it going are "profits," and an incentive to the workman for

more and better production decreases manufacturing costs.

The accompanying charts show in graphic form the six months' record of two manufacturers who had no production standards, but had an hourly rate standard. Both realized that manufacturing costs must be decreased somehow. Time studies were made in both cases, to determine the possible production and the per cent efficiency at which they were working on the hourly basis. Although both were in the same business, one was equipped a little better than the other, working at 62 per cent, while the other plant's efficiency was 58 per cent.

No. 1 chart shows the manufacturer who used the information gained from time studies in setting standards and installing a contract system. He paid his employees according to these standards, increasing the average wages 4 per cent over the old day work rate, increasing productive efficiency from 58 to 87 per cent, and decreasing the unit cost nearly 40 per cent.

No. 2 chart shows the manufacturer who did not use to advantage the information gained from time studies, but deliberately reduced the payroll by cutting the hourly rate of employees 20 per cent, foremen included, thinking he was reducing the unit cost 20 per cent. He soon found that this reduced production from 62 to 51 per cent, in addition to increasing the unit cost 9.5 per cent; and every man who remained on the job was dissatisfied. This plant had to close down entirely, four months after the reduction in wages went into effect. The comparative record shows a difference from 87 to 51 per cent in efficiency, and goes no further than the quitting point of the one in June. The other, since then, has made steady improvement, and made further gains in efficiency and reduction of unit costs by fair scientific reward methods.

To decrease manufacturing costs, labor must be encouraged; cutting a man's wages takes the "pep" out of him.

H. M. FITZ,

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McVicker Engineering Co.

Metropolitan Life Building,
Minneapolis, Minn.

Application of Time Study in the Foundry

To the Editor: For various reasons the time study element of modern or so-called scientific management has been slower in finding its way into the foundry than into the machine shop. If we stopped to analyze we would probably find that the average foundry is run on a looser basis than the average machine shop, which condition is hardly justifiable, especially in our foundries doing repetitive work. Of course, founding or molding may be considered as an art and was in use long before science developed the machine, and this may be one reason why the old methods have clung to foundrymen to some extent. Again it is a natural trait; and we are fortunate that such is the case—to tackle the easier job first.

The writer believes that it is easier to establish a standard time on a machine operation or to standardize machine work, which depends more on the machine than on the human element, than it is to establish standard time on most foundry operations where the human element is a large factor and some of the conditions seem practically beyond control. Too much credit cannot be given the machine shop man for the advance he has made in this respect and it certainly looks as if the time will soon come when those foundries which insist upon guessing at the time required and costs on various jobs will find themselves in an embarrassing position.

The real benefits that are to be derived from applying time study are to be had when the foundryman applies it for himself and by this it is not meant that the foundry superintendent or foreman should attempt to make time studies but that they should be made by some one thoroughly familiar with foundry practice and by one who also understands thoroughly the elementary principles of time study.

Co-operation by the supervisory force is absolutely essential and this can only be obtained when this force

confidence in those elements of time study which are being applied. Even after it is applied there are a hundred and one things that may turn up. The foreman usually debits them against time study and they begin to think that it is all wrong. At this point the part which they think is wrong must be carefully straightened out in their minds, and if encouraged they keep applying time study, and at the end of six months or more the results will be surprising, for even the most obstinate will be proud of the wonders brought about.

The time element is being applied in the foundry daily but there are many who do not realize they are using it. When the superintendent or foreman sets a piece work price, he considers how many pieces can be done per day or per hour; and when he estimates his equipment requirements, he takes into consideration the number of flasks, etc., required per day, thus using a time unit; and he goes further, he considers how long it will require to dispose of a ladle of iron and get the ladle back to the cupola again and so from this estimate, he arrives at the number of ladles required. And so if we will stop and consider practically everything we plan, or estimate, or consider, we bring in the element of time and it usually is a very important factor.

There is an old maxim which states that a thing worth doing is worth doing well, and this maxim certainly applies to the accurate application of the time element which we take into consideration so much, and of which we are many times unaware. Now there are many ways in which time can be measured correctly or perhaps we had better say the operations, movements, jobs, etc., but the one which seems the most practical and perhaps the cheapest, is the decimal stop watch in the hands of some one who can record or make an analytic or elementary time study and observation.

This will give quite an accurate record of all the movements entering into the particular proposition under consideration and likewise the time required in performing each. This is surely a big improvement over any person's estimate of the time required to perform work, or even the actual round or total time taken, or previous production records. We know from experience that many unnecessary movements have existed for years and likewise some times movements necessary to produce a high quality product have been omitted.

The writer believes that the time will soon come, if it is not already here, when foundries will not be able to afford to pay for unnecessary movements or in other words to waste human and mechanical energy. Nor will they be able to afford unnecessary equipment, but will have to apply time study or some other efficient method that will eliminate the waste movements and will route the equipment so that only the smallest amount of equipment will be purchased.

J. F. BLANK,

Foundry industrial engineer.

Greensburg, Pa., Oct. 4.

The Economic Status of the Dollar

To the Editor: What makes the dollar worth less than one hundred cents when we spend it is the fact that we have given less than one hundred cents worth of service when we have received it.

This is an economic truth which is so evident to some of us that we take it for granted that everyone understands it. As a matter of fact, however, it is little or not at all understood by the rank and file of employees, and now, while the pay envelopes are thinner, is a good time for employers to do a little educating in as elementary terms as possible.

Those to whom labor has hitherto listened have made it appear that the reason for the purchasing power of the dollar being so small is because the manufacturer or some intermediary keeps the most of it. There is no need at this time to review the figures which have been published from time to time showing how production has shrunk as wages have increased.

The idea I wish to convey is that the employee is loath to accept fewer dollars per week unless he can be convinced that those fewer dollars will constitute in reality a larger income. This will be the case if he will do his part by bringing his output per day up to

the old standard; in other words, by doing one hundred cents worth of work for every dollar received.

The workman lost his golden opportunity when he lent such a willing ear to the doctrine of restricted output with higher pay, for it is possible that but little wage adjustment would have been necessary if quality and quantity had at least been maintained. He would have comprehended the principle involved if on going to the corner grocery he had been informed that not only was a given article advanced in price but hereafter twelve ounces would constitute a pound. On the other hand, management lost its golden opportunity when it failed, or in many cases did not try, to convince labor of the unsoundness of such a doctrine and of inevitably resulting unemployment.

It seems as if employers would have to go on year after year confessing their inability to sell ideas to the employees as successfully as do the labor leaders. The latter retain the confidence of the workmen even when reducing their incomes by calling strikes. Employers do not gain that confidence even when increasing wages. What is the reason?

H. D. MURPHY.

Medford Hillside, Mass.

JAPAN CONTINUES BUYING

Purchases of Rails, Tin Plate and Sheets—Government Inquiry for 5000 Tons of Rails—German Competition

NEW YORK, Oct. 10.—Japanese purchases are continuing in fair volume, government and private railroad buying, tin plate and black sheets leading other products. Some of the gradual increase in buying from this market may be attributed to the feeling among the Japanese branches in New York that the bottom has been reached in the American market, for they are now advising home offices that the price trend is upward.

In rail purchases one Japanese export house has booked an order for 500 tons of 60-lb. rails for a railroad in Otaru, northern Japan, while an order totaling 1400 tons of 30-lb. rails for this district was placed with British interests. This same export house has sold 1000 tons of 90-lb. T rails to a Tokio municipal trolley line. A little more than 2000 tons of 30-lb. rails, A. S. C. E. sections, recently went to a German mill at a reported price of \$40 per ton, c.i.f. Japanese port. The Imperial Government Railways in Japan have issued a new inquiry calling for about 5000 tons of 60-lb., 75-lb. and 100-lb. rails. German quotations are in many instances low, compared with the American prices, c.i.f. port. Tank plates are reported to have been delivered, c.i.f. port, at \$39.50 per ton on a fairly large tonnage, while a price of £10 5s. (\$38.76) per ton, c.i.f. port, is said to have been made by German sellers on mild steel bars.

Tin plate has been active of late in Japanese purchases. One New York exporter reports having booked his third order in about three weeks for between 6000 and 7000 base boxes of oil can size tin plate. Other exporters report having received various sized orders totaling several thousand boxes. The present wave of tin plate buying is attributed by one Japanese house to the lower prevailing prices on that product in this country and the unsatisfactory conditions and prices in the Welsh tin plate industry, which generally receives a large portion of these purchases.

A Japanese inquiry for steel gas pipe that has been in the market for several months, calling for a total of 300 tons of pipe ranging through all sizes from ½ in. to 12 in., has been placed with a large Japanese export company. This company also reports booking an order for 240 tons of flat bars and heavy bookings of black sheets, besides the sale of several hundred Arco heaters of the American Radiator Co. The transmission tower inquiry calling for 610 towers for the Tokio Electric Light Co. and a smaller number for the Keihin Electric Light Co. in Japan, will be placed with a Japanese fabricating shop, but the steel will be purchased abroad—either in the United States or on the Continent, probably the latter because of price.

NEWARK FOUNDRYMEN MEET

Addressed by Dr. Richard Moldenke, Who Told of His Observations in Germany

"Something must be done by the United States to help the people across the water to pay for the material they need in work," said Dr. Richard Moldenke, consulting engineer, Watchung, N. J., who addressed the first fall meeting of the Newark Foundrymen's Association at the Down Town Club, Newark, Wednesday evening, Oct. 5. In his address, Dr. Moldenke recounted many of his experiences while in Germany in the spring of this year on a financial mission of semi-official character. "There are 400,000,000 persons in Europe who want goods but cannot pay for them except in work," he said. "Credits must be arranged so that purchases can be made and Europe pay in this way."

Little German Competition Except in Chemicals

Only two nations in Europe, he said, are really working—Belgium and Germany. In both countries, with the exception of the occupied districts of Germany, it is not unusual at night to see the lights of many plants which are operating on an extra shift. As to German competition, there will be no serious attempts along this line, except in chemicals. This was the great German product prior to the war and this, the Germans believe, should be Germany's greatest product now. Eventually, Germany and Russia will be even closer than they are now, for the bond between the two countries is greater today than before the war. Russia needs German engineers, technical men and German products, and Germany, which is today only 20 per cent agricultural and 80 per cent industrial, needs Russian food.

Dr. Moldenke said that the least work is being done in the occupied districts largely because of the tax of 50 per cent on all goods exported. In the collection of this tax, he said, the French are the most exacting, requiring a license to ship for even a small parcel and as only about 200 applications a day can be handled, there were more than 300,000 applications piled up when he was in Germany in the spring. This situation has created the impression in Germany that France is determined to throttle German industry. The British and Americans are inclined to be more lenient. Dr. Moldenke explained this situation to show one of the reasons why the popular feeling in Germany against the English, which was so great during the war, is now turning against the French and a far more friendly attitude prevails toward the English.

New Method of Briquetting Borings

In the briquetting of borings by one of the new methods, the borings are put into a large drum, heated with gas and when red hot are transferred to a case of the proper size, where under a steam hammer and with a single blow a briquette is formed. These briquettes are being made notably thin for facility in melting. Another interesting new method noticed by Dr. Moldenke was in desulphurizing iron in the ladle. When the iron started to boil a compound considerably stronger than soda ash—probably potash—was added to the top of the ladle. By the use of this compound it was possible to start with as high as 0.12 per cent sulphur and reduce to 0.06 per cent.

He reported considerable activity in the Krupp plants in the production of high silicon acid resisting castings. For use in the manufacture of nitric acid the Krupps have perfected a stainless, acid-resisting steel. Another new development by German metallurgists is a high silicon iron.

In concluding Dr. Moldenke pointed out that despite her present poverty and bad financial condition Germany has appropriated money for the establishment of two new institutions for investigation and research in metallurgy and will undoubtedly continue to progress along these lines.

The meeting of the association was well attended.

Accessions to membership were as follows: The F. & H. Foundry Co., Franklin Williams, Inc., Phoenix Brass Foundry, all brass foundries of Newark and the American Foundry Equipment Co., New York.

COMING MEETINGS

October

National Implement and Vehicle Association. Oct. 12 to 14. Congress Hotel, Chicago. Secretary, H. J. Sameit, 72 West Adams Street, Chicago.

American Society of Lubrication Engineers. Oct. 13 and 14. First annual convention, Chicago. Secretary, J. L. Overholt, Monadnock Block, Chicago.

American Gear Manufacturers' Association. Oct. 13 to 15. Fall meeting, Powers Hotel, Rochester, N. Y. Secretary, F. D. Hamlin, 4401 Germantown Avenue, Philadelphia.

National Hardware Association. Oct. 18. Meeting of metal branch, Marlborough-Blenheim Hotel, Atlantic City, N. J. Secretary, George A. Fernley, 505 Arch Street, Philadelphia.

National Machine Tool Builders' Association. Oct. 18, 19 and 20. Annual meeting, Hotel Astor, New York. General Manager, E. F. DuBrul, 817 Provident Bank Building, Cincinnati.

National Supply and Machinery Dealers' Association. Oct. 19. Meeting of machine tool section, Hotel Astor, New York. Secretary, Thomas A. Fernley, 505 Arch Street, Philadelphia.

Industrial Relations Conference. Oct. 24 to 27. Harrisburg, Pa., under auspices of Department of Labor and Industry of Pennsylvania.

November

Industrial Cost Association. Nov. 2, 3 and 4. National Cost Conference, Pittsburgh. Secretary, A. A. Alles, Jr., Peoples Bank Building, Pittsburgh.

National Founders' Association. Nov. 16 and 17. Annual meeting, Hotel Astor, New York. Secretary, J. M. Taylor, 29 South La Salle Street, Chicago.

National Hardware Association Convention

During the week Oct. 17 to 22 the National Hardware Association will hold, at the Marlborough-Blenheim, Atlantic City, N. J., its twenty-seventh annual convention. The two auxiliary branches—the Metal Branch and the Automobile Accessories Branch—will have special programs, the former on Oct. 18, the latter on Oct. 20 and 21 in connection with the fourth annual exhibition of automobile accessories, to be held on Young's "million-dollar pier." Besides these two branches, there will be held, on Oct. 18, separate meetings of the Small Tool Group, the House Furnishing Hardware Group and the Builders' Hardware Group.

Following is the program for the meeting of the Metal Branch:

Opening Remarks—W. H. Donlevy, chairman of the Metal Branch.

"World Readjustment and the American Steel Industry"—George M. Verity, president American Rolling Mill Co., Middletown, Ohio.

"Iron and Steel Prices Compared with Other Products"—Sidney G. Koon, THE IRON AGE, New York.

Report of the Sheet Copper Committee—J. George Fuchs, Bruce & Cook, New York.

"Our Trade Development Work"—Paul F. Brandstedt, chairman Trade Development Committee, National Association of Sheet Metal Contractors, Washington.

"Co-operation in the Copper Industry"—W. B. Price, Scovill Mfg. Co., Waterbury, Conn.

Report of the Publicity Conference Committee—F. O. Schoedinger, Columbus, Ohio.

Discussion on "Sheet Metal Market Conditions for the Balance of 1921 and the First Quarter of 1922," participated in by representatives of the mills and distributors from different sections of the country.

Engineering Meetings in New York Metropolitan District

A meeting on pulverized fuel is to be held under the auspices of the Metropolitan section of the American Society of Mechanical Engineers on Dec. 16 at Bayonne, N. J. Among other meetings scheduled are the following: Industrial fuel gases, Oct. 28, at Newark, N. J.; factory production methods, Jan. 13, at Elizabeth, N. J.; industrial power requirements, Jan. 27, at New York; die castings, March 10, at Newark, N. J., and on material handling, April 28, at New York.

Casting and Working Non-Ferrous Metals

British Institute of Metals Meets in Birmingham—Steel Casting Methods Applied to Brass—Progressive Cold Drawing Discussed

(Special Correspondence)

LONDON, Sept. 26.—The autumn meeting of the Institute of Metals was held in Birmingham from Sept. 21 to 23, the attendance being exceptionally large, owing to the considerable number of local members. At the business sessions the time for discussion of the papers was limited, but a commendable effort was made to afford an opportunity for discussing every paper presented to the meeting. In retrospect, one is inclined to wonder if, after all, it would not have been better to allow fuller discussions on some of the papers and let the others take their chance. Interesting observations are apt, when the time-rationing system is too strictly applied, to be cut short to make way for the presentation of another paper which may evoke merely polite compliments, or that almost unanimous silence which is often the polite reverse. A happy medium between the inexorable guillotine and *laissez faire* is difficult to obtain, and the problem of the ideal conduct of a scientific discussion remains insoluble. The time-rationing system could not have been applied with greater success and tact than it was by the president, Engineer Vice-Admiral Sir George Goodwin, who occupied the chair at the business sessions. These were held in the Municipal Technical School.

The first session opened on Sept. 21. R. H. Greaves of Woolwich introduced the following paper, written in collaboration with Prof. A. A. Read of Cardiff:

The Properties of Some Nickel-Aluminum-Copper Alloys

In the course of a previous investigation on the nickel-aluminum-copper alloys, the authors observed a type of alloy which, while extremely soft and ductile on quenching from 900 deg. C., was considerably hardened by slow cooling. The present paper records the results of a further investigation of these properties, which are summarized as follows:

In some of the copper-rich nickel-aluminum-copper alloys the α solution will retain much more nickel and aluminum at 500 deg. C. than at ordinary temperatures. Alloys typical of the region comprised between the limits of composition of the α solution at 900 deg. and at ordinary temperatures have been examined. These alloys, while relatively soft on quenching from 900 deg., are hardened by slow cooling from that temperature or by reheating to lower temperatures. This change in properties is the result of the appearance of a new constituent (probably a nickel-aluminum-copper solid solution), the separation of which is accompanied by changes in the density and electrical conductivity of the alloy in addition to its effect on tensile, hardness, notched bar, and other tests.

The separation of this special constituent takes place somewhat slowly, so that chill-cast alloys and hot-rolled rods of small section consist almost wholly of the α constituent. In this condition the alloys can be cold-rolled, though if cold-rolling of the slowly cooled alloys is attempted they crack badly. If annealing is required during cold-rolling the alloy must be treated to 900 deg. and cooled rapidly in air or water.

The cold-rolled rod, obtained by hot-rolling followed by a few passes in the cold, thus consists almost wholly of the α constituent, and its behaviour on low temperature annealing presents some features of interest. For complete restoration of the elastic limit in tension annealing for $\frac{1}{2}$ hour at 300 to 500 deg. C. is required. This may or may not be accompanied by an increase in the maximum tensile strength according to the degree of cold-work to which the alloy has been subjected. In any case, softening proceeds very slowly up to 500 deg., at which temperature precipitation of the nickel-aluminum rich constituent begins to take place at an appreciable rate, with the result that with some compositions a progressive increase of hardness is obtained by holding the alloy at 500 deg. C. If the separation is sufficient this may more than counterbalance the previous softening, giving an alloy of high elastic limit and tensile strength.

and good elongation (e. g. a maximum load of over 50 tons per sq. in. with an elongation of 20 per cent.).

The rate of cooling from a temperature above that at which the α solution begins to deposit the special constituent has a great influence on the mechanical properties of the heat-treated alloys. The hardest product is, however, obtained by reheating the quenched alloy for some time at 600 to 700 deg. C. (say, two hours at 600 deg. or $\frac{1}{2}$ hour at 700 deg.). The alloys so treated generally give better properties than are obtained by any uniform rate of slow cooling (e. g. yield point over 20 tons per sq. in., maximum load over 40 tons per sq. in., elongation about 15 to 25 per cent.).

The fatigue limits to alternating stress are much higher than the tensile elastic limits in the quenched alloys, but in the quenched and tempered alloys they are approximately the same as the elastic limit in tension. The heat-treated alloys show considerable endurance under alternating stresses above their true fatigue limit, the determination of which involves a number of prolonged tests.

Discussion

Dr. Rosenhain pointed out the interest attaching to this research in establishing analogies between the behavior of these non-ferrous alloys and steels. Miss M. L. V. Gayler of Teddington asked a number of detail questions, while Dr. W. H. Hatfield of Sheffield challenged the authors' conclusions regarding the fatigue limit, and thought the experimental evidence should be very carefully reconsidered. Dr. G. D. Bengough of London discussed details and Mr. Greaves in reply referred Dr. Hatfield to the evidence set forth in the paper.

Lead in Gun Metal

R. T. Rolfe of Bedford then presented a paper, entitled, "The Effect of Increasing Proportions of Lead Upon the Properties of Admiralty Gun Metal, with an Appendix, Dealing with the Effect of Lead on Gun Metal Containing Copper, 85, Tin, 5, and Zinc, 10 Per Cent." The author concludes:

In sand-cast Admiralty gun metal, the addition of lead up to a certain proportion progressively increases the strength and ductility and decreases the hardness. At a point corresponding to the presence of about 1.5 per cent of lead, the strength and ductility begin to fall away and the hardness increases. Maximum resistance to repeated impact is obtained from the alloy containing about 1 per cent of lead, larger quantities causing a progressive falling away in this respect. There is no apparent effect on the soundness of sand-cast gun metal containing up to 1.68 per cent of lead. Lead is readily detectable in the microstructure.

In chill-cast gun metal these effects are somewhat masked. The effect of increasing lead on the hardness is well correlated with that of the sand-cast material, with a change-point at about 1.5 per cent of lead, but associated with a minimum rather than a maximum strength figure. The ductility shows a progressive falling away as the proportion of lead increases. The same remark applies to the impact figure in the case of the metal melted twice, the results from the metal melted once being much more irregular. There is no apparent effect on the soundness of chill-cast gun metal containing up to 1.68 per cent of lead. Lead is not so readily observable in the etched material, but can be quite well detected on the plain polished surface.

Apart from the effect of lead on the mechanical test results, the general considerations regarding the effect of lead are also discussed, including the question of ligation, machinability of leaded gun metal, corrosion, and behavior as a bearing metal.

It is suggested that in sand-cast gun metal, the proportion of lead permitted by the Admiralty specification might with advantage be increased from 0.5 to 1 per cent.

Discussion

Dr. F. Johnson, Birmingham, said that with regard to the effect of arsenic the author's attitude in

the last few years had completely changed, and he pointed out a number of differences between observations in the author's present and previous papers.

J. S. G. Primrose, Ipswich, said he had always thought the improvement was due to the liquation of lead into cavities in the metal, but the author had shown that there was distinct improvement in the alloy itself. H. L. Reason, Birmingham, confirmed the statement that sand-cast alloys were considerably improved by remelting. Sir George Goodwin, referring to the admiralty limit for lead in gun metal, said that there was very good reason for keeping within 0.5 per cent, seeing that the strength falls off so much at the higher temperatures to which the metal was now more and more exposed in practice.

The Casting of Brass Ingots

A paper with the above title, by R. Genders, Woolwich, was read in abstract by the author, but is here reproduced in full, only the figures being omitted.

During the examination of large numbers of specimens of hollow-drawn articles made from 70:30 brass rod which were subjected to expansion of the walls in manufacture, and later in service, it was found that where failures occurred, whether during manufacture or in service, they were due almost exclusively to the presence of inclusions of non-metallic matter which must have originated in the casting of the ingot. The surface of the burst or split in the wall was generally discolored or black, and transverse sections through portions below the split invariably disclosed the responsible defect.

It has been found that defects similar to those in articles made from rod by drawing very seldom cause failure in tubes and similar articles, such as cartridge cases, which are drawn from a disc. This would not be unexpected. In the rolling of an ingot to rod any defects, such as inclusions of non-metallic matter, would be elongated to an extent depending on the relative cross-sections of the ingot and the rod. Laterally, the defects may have their largest dimension in any direction, depending on the original position in the ingot and the manner in which the rolling has been done, but there is no doubt that a large proportion of defects are approximately radial in the finished rod and remain so throughout manufacture. Non-metallic inclusions have no useful strength and, in their effect on the mechanical properties of the metal, amount practically to areas of discontinuity. Thus an inclusion, radial in the wall of a tube, reduces the effective thickness of the wall by an amount equal to its radial length, and further, probably acts as a notch from which a crack may start on expansion of the tube. When the ingot is made into strip by rolling, any defects present are elongated in the form of plates in planes parallel to the surfaces of the strip. In the cupping operations such defects would be also distorted into cup form and finally drawn into the walls of the tube as thin plates running circumferentially and concentrically with the inside and outside surfaces. A defect running in this direction would be of little consequence as regards reduction of the effective thickness of the wall, and would be much less likely to serve as a nucleus for the starting of a crack.

The methods used in casting ingots of brass vary considerably in detail. Much consideration is given to the saving of rolling, and ingots are made in a correspondingly suitable form, those used for the making of rod commonly being very long and narrow.

Such forms are not particularly undesirable when the finished product is solid, but where a hollow article, subject to expanding stresses in use, is to be made, the avoidance of inclusions of foreign matter is vital, and the form of ingot requires considerable modification. The long narrow ingot mold leads to splashing, and the solidification of the metal is very rapid, leaving no time for the rising of trapped dross, etc. The pipe forms rapidly and is steep and narrow, and the intermittent replenishment with molten metal during solidification results in the inclosing of the foreign matter on the surface of the previous depression. The solidification of the metal inward from the sides of a rapidly filled parallel mold is practically uniform along the length, and shrinkage cavities are formed in the central region, due to lack of fluid metal to take up contraction when the metal below solidifies.

In experiments which were carried out to minimize the occurrence of non-metallic inclusions, the first step taken was to adopt a form of ingot whose length was not great in proportion to the cross-sectional area. The ingots made were 3 in. square and 30 in. in length, as compared with the ingots 6 to 7 ft. in length and 1½ in. square section in common use. Steel-making practice was followed in introducing a hot sinking head or "dozzle." The dozzle (a short fireclay sleeve) is heated to the melting furnace tempera-

ture and inserted in the top of the mould, resting on a small ledge. The molten brass is poured through the dozzle, which is filled to the top. No pipe is formed in the ingot proper, the metal in the dozzle remaining quite fluid and sinking gradually, with level surface, to feed the contraction of the ingot below. Additions of metal may be made at any time to the metal in the dozzle without risk of introducing defects into the ingot, any dross rising to the top of the sill fluid head. The dozzle is thus an automatic feeder, insuring that the top portion of the ingot is free from piping defects. There is no need to discard any of the top end of the ingot beyond the metal which has finally solidified in the dozzle. It was found later that these experiments were undertaken at about the same time as the introduction of dozzle feeding for flat cartridge case ingots by Barclay.*

Central shrinkage cavities were avoided by regulating the rate of pouring so that the ingot, when just completely poured, had a fair temperature gradient from bottom to top. This necessitated a rate of pouring much below that for the normal foundry practice, and where two ingots were poured from one pot the cooling in the crucible of the metal for the second ingot was appreciable. To overcome this difficulty the molds were tapered, the top being enlarged by increasing amounts in successive experiments, and ingots were cast at the usual foundry speed. It was found that with a mold 3½ in. square at the top, tapering to 3 in. at the bottom, no shrinkage cavities were formed and the ingot appeared to be practically perfect as regards soundness. The use of a tapered ingot results in either a tapered strip or the necessity for a certain amount of edge rolling. Its adoption, however, appears to be justified by the greater certainty with which sound ingots can be produced.

By these methods, failures which previously reached large percentages were reduced to practically nil. Wastage during manufacture was reduced from about 25 per cent to a negligible figure.

A further refinement which the author would like to see adopted in non-ferrous foundries is the use of a ladle and bottom pouring. This method has been adopted with considerable success in one particular works, for the manufacture of articles in which non-metallic inclusions are to be avoided. It is fully recognized that in a great many cases economic considerations would render such methods as the use of short broad tapered ingots with dozzle feed beyond reach, but cases have come under the author's notice where, had it been recognized that the avoidance of non-metallic inclusions was of primary importance and the costlier methods adopted, such methods would undoubtedly have proved more economical than the endless replacement of wasters in manufacture and rejections.

Discussion

Dr. Rosenhain said that in nearly every case troubles in manufacture could be traced back to defects in the original ingot. The rate of pouring required careful attention to avoid shrinkage cavities and non-metallic impurities. It was necessary to regulate both the rate of flow and also the path of flow. It was very difficult to get good results in long, narrow molds. Harold Moore, Woolwich, confirmed the difficulty of casting sound ingots in long molds. R. J. Redding, Birmingham, said trouble would be avoided if the pouring were carefully done and continuous. The author gave five remedies for solid inclusions, but he (the speaker) distrusted a doctor who had more than one remedy for the same disease. His remedy was to sack the caster and engage another, and train him to cast his metal at the right temperature and speed. With the present sizes and methods of work, he saw no necessity for the dozzle, and useless work was done on a larger scale he did not favor the adoption of steel-casting methods. The author, in his reply, made it clear that he was not condemning the long, narrow ingot, but pointing out the difficulties met with and the means of overcoming them.

Density of the Copper-Zinc Alloys

This paper, by T. G. Bamford, Birmingham, gives the results of a number of careful density determinations made at Birmingham University. It was introduced by the author and the discussion was opened by Professor Turner with some words of appreciation. Dr. Rosenhain, referring to the work of Professor Bragg and others on molecular structure, said one of the critical data required was an exact knowledge of the density. Dr. F. Johnson drew attention to the difference in density of chill and sand castings and

*Metal Industry, May 2, 1919.

suggested that this was due to porosity in the sand castings. The author in reply said that no porosity could be found in the sand castings even under the microscope.

A paper by Dr. F. Johnson on "Experiments in the Working and Annealing of Copper," was then presented by the author. It does not claim to represent more than "an exploratory incursion into the subject," and evoked no discussion beyond a few amiable platitudes from Professor Turner, who, no doubt, wished to convey to the author that his past sins have been forgiven even if there was nothing to say about his present paper.

Cold-Drawing Effects

W. Cartwright introduced a paper on "The Effect of Progressive Cold-Drawing Upon Some of the Physical Properties of Low-Tin Bronze," written jointly with W. E. Alkins, whose pioneer investigations on progressive cold-drawing created something like a sensation. It was found that the changes in physical properties were not continuous, but took place in "critical ranges." The present paper is on the same lines and records the variation during cold-drawing of the tensile strength, specific volume, and scleroscope hardness of low-tin bronze. Dr. F. Johnson opened the discussion by pointing out the general similarity of the curves to those obtained by himself under different conditions.

Professor Desch, Sheffield, said the results of the authors must be accepted as accurate, as no fault could be found with their experimental methods. He thought overdrawing at the later stages of reduction might account for the results. Dr. Rosenhain questioned if the alloy were really in a state of equilibrium. If not, anomalous changes of density might occur at certain stages of cold drawing.

Dr. F. C. Thompson, Manchester, thought a more irregular curve would be obtained if the results were due to overdrawing. He could not agree with Dr. Rosenhain regarding lack of equilibrium because these effects had been found in practically every other material investigated. He suggested that in cold-drawing cones of maximum stress were produced, which met at a certain stage of the drawing, and at these points the effects recorded were obtained. The author briefly replied and the meeting adjourned.

Inland Steel Co. Resumes Work on Rail Mill

The Inland Steel Co. has resumed work on the installation of equipment for the rolling of rails at its Indiana Harbor plant. This work was first started about a year ago, and was then indefinitely postponed. The 28-in. structural mill will be used to roll the rails and the necessary rolls are now being turned. Straightening presses, ending machines, the necessary tables and the inspection bed are now being installed. A mill building extension, 100 by 400 ft., is now being erected, and beyond it a yard served by overhead crane of the same dimensions. The covered portion will contain the drilling, straightening and ending equipment and the uncovered part, the inspection beds. It is estimated that the mill will have a capacity of 2000 tons of rails per day.

Farm Machinery Reduction

The Emerson-Brantingham Co., Rockford, Ill., has announced a 10 to 20 per cent reduction in prices on its entire line of farm machinery, including tillage implements, harvesters, tractors and threshers. This is the second substantial reduction made by the company in 1921.

Since the regular date for the meeting of the New England Foundrymen's Association was on Wednesday, Oct. 12, which was Columbus Day, a legal holiday, postponement was made until the evening of Oct. 19.

The Electrical Alloy Co., Morristown, N. J., has recently taken an order for 50,000 lb. of electrode wire from the Champion Spark Plug Co., Toledo, Ohio.

SHEET MILL ACTIVITY

Slight Decrease in Mahoning Valley—Other Operations Well Sustained

YOUNGSTOWN, OHIO, Oct. 11.—Denoting decrease in full-finished sheet requirements from the automobile industry, the first break in the continuous capacity operating record of the Newton Steel Co. since April 1 was made this week, when the company reduced the number of its active hot mills at its Newton Falls plant from 10 to six. It started six mills March 1 and broadened to 10 shortly thereafter, maintaining full production ever since. Repairs will be made to the idle units following their protracted rolling.

With exception of a slight break in sheet mill activity, steel production is well sustained this week in the Mahoning and Shenango Valleys. The most notable single advance is made at the Girard works of the A. M. Byers Co., Pittsburgh, which is in full operation with the exception of two skelp mills. All of the 88 puddle furnaces at this plant are on the active list this week.

Finishing departments of the Carnegie Steel Co. in the Youngstown district are operating at 60 per cent. But 75 of the 105 sheet mills in the Valley are rolling, as compared with 81 the week before. Of the 66 open-hearth furnaces, 42 are charged, including 30 of the 51 independent units. Two of three Bessemer plants are making steel, while eight of 17 pipe furnaces are fired.

Sheet mills are being operated on the following basis: Youngstown Sheet & Tube Co., 15; Brier Hill Steel Co., 19; Trumbull Steel Co., 13; Republic Iron & Steel Co., 9; Sharon Steel Hoop Co., 5; Falcon Steel Co., 8 and Newton Steel Co., 6. Mahoning Valley Steel Co., which is idle, will partially resume next week.

Trumbull Steel Co. is operating all of its 19 tin mills at its Trumbull works in Warren this week.

Wage Reduction at Cincinnati

The building trades employees of Cincinnati, through the report of the umpire of the wage board, Rabbi David Phillipson, will have their wages reduced 12½c. per hr., commencing Nov. 8. The decision of the umpire is binding on both sides, the employers as well as the union members. The average wages paid in the building industry in Cincinnati has been 94c. per hr., which will be reduced to 81½c. The reduction is exactly one-half of the cut demanded by the Building Construction Employers' Association. The unions represented on the wage board had declined to accept any reduction; so the matter was referred to the umpire, with the above result. In his report fixing the new scale, Rabbi Phillipson said: "The laborer is a human being and worthy of all the considerations of humanity, but he is also a member of the larger community of which he forms a part. He must take his share of the weal or woe of that community; he has shared in the prosperity of the war period; his wages advanced greatly; he can not expect to be altogether exempt from the reaction which has set in."

Will Keep Car Shops Busy

According to D. T. Murray, general agent at Youngstown, Ohio, of the New York Central Railroad, car shops owned by private concerns accepting repair work from the railroads will be kept busy during the next two years. He bases his estimate on the capacity of existing plants and the known number of bad-order cars. Under Federal control many cars deteriorated through failure to paint them and the bodies often became completely honey-combed. Many cars, it is also pointed out, which were shopped, had become so thin in the bodies that they buckled in heavy trains and were discarded as junk or sent to sidings as unfit for service. Thousands of these cars will likely be sent to the scrap pile. Inspections are being made of side-tracked cars to determine which can be repaired.

Iron and Steel Markets

LOWER FREIGHTS ON ORE

Little Effect on Pig Iron and Steel

Steel Corporation Running at 40 Per Cent— Further Release of Pennsylvania Rails

The reduction of 28 per cent in freight rates on iron ore from both lower Lake ports and the seaboard, effective Oct. 20, means little to the steel trade except as it may point to lower freights on coal, coke and possibly finished materials.

While there has been much call from iron and steel producers for lower freights as a stimulant to business, fear is now expressed in the same quarters that buyers may be encouraged by the reduction on ore to wait for similar action on pig iron and rolled steel and then to look for lower market prices. Producers contend that any saving on freights would merely act to reduce their losses. It is pointed out also that nearly all blast furnaces have on hand enough ore moved on high freights to last until spring. On all ore shipped after Oct. 20 the saving would be 75 cents per ton of pig iron at Pittsburgh and 56 cents at Youngstown.

The week's figures confirm recent reports of improvement, but in moderate terms. Steel ingot production in September was 1,174,000 tons for the 30 companies reporting, against 1,138,000 tons in August, an apparent increase of 3 per cent. But counting out Labor Day, the daily rate in September was nearly 10 per cent greater than in August.

The Steel Corporation's unfilled orders on Sept. 30 showed the first increase (28,000 tons) in 13 months. But shipments in September on the large bookings of wire and sheets were less than the common estimate.

Lake Superior iron ore shipments last month were 3,913,000 tons, against 8,923,000 tons in September, 1920. To Oct. 1 the total was 18,661,000 tons, against 44,273,000 to that date last year, a falling off of 58 per cent.

The recent effort to get business in the heavier steel products by announcements of prospective advances to 1.65c. for bars and 1.75c. for plates and shapes has not had large results. In general the volume of new business fell off in the last week. Bars have been sold \$1 to \$2 per ton below the 1.60c. level, though that is the usual minimum. Plate and structural mill schedules continue quite unsatisfactory.

The Steel Corporation's operation this week is a

fraction above 40 per cent. The average of independent companies is somewhat less.

The Pennsylvania Railroad has called for additional rollings on its 1921 rail contract, bringing the total up to 35,000 or 40,000 tons.

An Ohio sheet mill names Oct. 15 as the date of a \$5 advance on lighter gages. Meanwhile it is selling heavier gages of blue annealed at 2.25c., or \$5 per ton below the general market.

The purchase of 1500 hopper cars by the Lackawanna Railroad calls for 18,000 tons of steel.

For a new pipe line for New York's water supply system 20,000 tons of plates will shortly be bought.

General structural lettings of the week do not appear to exceed 5000 tons.

Foreign pig iron is being sold on the Pacific Coast at several dollars per ton below American iron, about 1500 tons from Alsace-Lorraine having been disposed of at \$29 to \$31. All domestic pig iron markets are very dull with no important tonnages pending.

Japan's activity in rails is noteworthy. A late inquiry covers 5000 tons of heavy sections, following recent buying of 1500 tons of heavy rails and 3400 tons of light rails, the latter divided between British and German mills. The price basis was close to \$40 per ton at Japanese port.

In tin plate and sheets Japanese business continues to be a factor. A third order in three weeks has been placed for 6000 boxes. Pacific Coast exports of tin plate have moved at \$5.90, Seattle, for some 16,000 boxes.

Pittsburgh

PITTSBURGH, Oct. 11.

The possibility of an early reduction in railroad freight rates now enters into the picture of the iron and steel situation. Already the railroads have obtained permission to make a 28 per cent reduction in the rates on ore, or to virtually restore the tariffs in effect prior to Aug. 26, 1920, to go into effect on Oct. 20, and to hold until Dec. 31. Little good will result from this reduction for the reason that there are only a few producers of iron who have not about all the ore in their furnace yards that will be required during the remainder of the year. The belief is common, however, that the ore-rate reduction is the first of a general cut in rates on basic or raw materials.

Railroads already are figuring on lower rates on coal and this probably will include coke. It has apparently dawned upon railroad managements that upon them depends, to a large degree, how soon the recovery in business will get under way. It also is evident that the railroads cannot continue to pay present wages, which are so materially above those now common in industry. A reduction in wages would find public support if preceded by substantial cuts in freight and pas-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Oct. 11, 1921	Oct. 4, 1921	Sept. 13, 1921	Oct. 12, 1920
No. 2X, Philadelphia...	\$21.84	\$21.84	\$20.84	\$53.51
No. 2, Valley furnace...	21.00	21.00	21.00	47.00
No. 2, Southern, Cin'ty...	23.50	23.50	23.50	46.50
No. 2, Birmingham, Ala.†	19.00	19.00	19.00	42.00
No. 2 foundry, Chicago*	21.00	21.00	22.00	46.00
Basic, del'd, eastern Pa...	20.50	20.50	19.25	51.26
Basic, Valley furnace...	19.25	19.25	19.00	46.00
Bessemer, Pittsburgh...	21.96	21.96	21.96	50.46
Malleable, Chicago*	21.00	21.00	22.00	46.50
Malleable, Valley	20.50	20.50	20.00	50.00
Gray forge, Pittsburgh...	21.96	21.96	21.96	47.96
L. S. charcoal, Chicago...	31.50	31.50	33.50	58.50
Ferromanganese, del'd...	60.00	60.00	70.00	170.00

Rails, Billets, etc., Per Gross Ton:	Oct. 11, 1921	Oct. 4, 1921	Sept. 13, 1921	Oct. 12, 1920
Bess. rails, heavy, at mill.	\$45.00	\$45.00	\$45.00	\$55.00
O.-h. rails, heavy, at mill.	47.00	47.00	47.00	57.00
Bess. billets, Pittsburgh...	29.00	29.00	29.00	55.00
O.-h. billets, Pittsburgh...	29.00	29.00	29.00	55.00
O.-h. sheet bars, P'gh...	30.00	32.00	30.00	62.50
Forging billets, base, P'gh.	35.00	35.00	34.00	70.00
O.-h. billets, Phila...	35.74	35.74	35.74	60.74
Wire rods, Pittsburgh...	41.00	41.00	38.00	75.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb...	1.60	1.60	1.70	3.25

Finished Iron and Steel,	Oct. 11, 1921	Oct. 4, 1921	Sept. 13, 1921	Oct. 12, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.95	1.95	1.95	4.85
Iron bars, Chicago...	1.75	1.75	1.75	3.75
Steel bars, Pittsburgh...	1.60	1.60	1.65	3.25
Steel bars, Chicago...	1.75	1.75	1.85	2.73
Steel bars, New York...	1.98	1.98	2.03	3.63
Tank plates, Pittsburgh...	1.60	1.60	1.65	3.25
Tank plates, Chicago...	1.75	1.65	1.75	3.03
Tank plates, New York...	1.98	1.98	2.03	3.63
Beams, Pittsburgh...	1.60	1.60	1.65	3.10
Beams, Chicago...	1.75	1.75	1.80	2.83
Beams, New York...	1.98	1.98	2.03	3.48
Steel hoops, Pittsburgh...	2.25	2.25	2.15	5.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

†Silica, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Oct. 11, 1921	Oct. 4, 1921	Sept. 13, 1921	Oct. 12, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	3.00	3.00	2.75	6.75
Sheets, galv., No. 28, P'gh.	4.00	4.00	3.75	8.25
Sheets, blue an'd, 9 & 10.	2.25	2.25	2.20	5.00
Wire nails, Pittsburgh...	2.90	2.90	2.90	4.25
Plain wire, P'gh...	2.60	2.60	2.60	3.75
Barbed wire, galv., P'gh...	3.55	3.55	3.55	4.45
Tin plate, 100-lb. box, P'gh.	\$5.25	\$5.25	\$5.25	\$8.50

Old Material, Per Gross Ton:	Oct. 11, 1921	Oct. 4, 1921	Sept. 13, 1921	Oct. 12, 1920
Carwheels, Chicago	\$16.50	\$16.00	\$13.50	\$36.00
Carwheels, Philadelphia	17.00	17.00	17.00	41.00
Heavy steel scrap, P'gh...	14.00	14.00	13.50	28.00
Heavy steel scrap, Phila.	12.00	11.75	11.50	23.00
Heavy steel scrap, Ch'go.	12.25	12.25	11.00	22.00
No. 1 cast, Pittsburgh...	17.50	17.50	17.00	40.00
No. 1 cast, Philadelphia...	17.00	17.00	17.00	39.00
No. 1 cast, Ch'go (net ton)	13.50	13.50	13.25	29.00
No. 1 RR. wrot, Phila...	16.00	15.60	15.00	31.00
No. 1 RR. wrot, Ch'go (net)	13.00	12.50	11.50	20.00

Coke, Connellsville, Per Net Ton at Oven:	Oct. 11, 1921	Oct. 4, 1921	Sept. 13, 1921	Oct. 12, 1920
Furnace coke, prompt...	\$3.35	\$3.25	\$3.25	\$17.00
Foundry coke, prompt...	4.50	4.25	4.25	18.00

Metals,	Oct. 11, 1921	Oct. 4, 1921	Sept. 13, 1921	Oct. 12, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.12 1/2	12.62 1/2	12.25	17.50
Electrolytic copper, N. Y.	12.82 1/2	12.37 1/2	12.00	17.50
Zinc, St. Louis...	4.60	4.55	4.20	7.37 1/2
Zinc, New York...	5.10	5.05	4.70	7.50
Lead, St. Louis...	4.50	4.50	4.40	7.37 1/2
Lead, New York...	4.70	4.70	4.60	7.50
Tin, New York...	27.00	26.75	26.75	41.50
Antimony (Asiatic), N. Y.	5.00	5.00	4.45	7.00

Composite Price, Oct. 11, 1921, Finished Steel, 2.236c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	}	Oct. 4, 1921,	2.236c.
These products constitute 88 per cent of the United States output of finished steel.		Sept. 13, 1921,	2.279c.
		Oct. 12, 1920,	3.867c.
		10-year pre-war average,	1.684c.

Composite Price, Oct. 11, 1921, Pig Iron, \$19.93 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	}	Oct. 4, 1921,	\$19.93
		Sept. 13, 1921,	19.81
		Oct. 12, 1920,	46.59
		10-year pre-war average,	15.72

senger rates. The likelihood of lower freight rates, however, constitutes a problem for the iron and steel industry, in that consumers will immediately seek to have any such savings as the producers may be able to effect passed along to them. Steel manufacturers declare that there is no room for further concessions from the prices which lately have been common, because at 1.50c., at which plates, shapes and bars recently have been sold, and which probably can be done again against desirable orders, the market is back to the pre-war levels, plus the difference between 1914 and present-day labor costs, while even the wiping out of the last freight rate increase still would leave rates about 60 per cent above the pre-war levels. The recent effort to drive in business in the heavier lines by increasing the prices does not seem to have been successful and now that there is some promise of lower costs through lower freight charges, it is probable that the effort of manufacturers will be to hold the market at the basis at which it has been possible to get business.

Business of the week as a whole has been quieter than it was in September. Some sheet tonnages have been

booked, both by the American Sheet & Tin Plate Co. and the independents, on a basis of 3c. for black sheets, 4c. for galvanized and 2.50c. for blue annealed, but buyers no longer are hungry for tonnages and the announced intention of some of the Youngstown makers of advancing prices \$5 per ton next Saturday has failed to appreciably stimulate business. The leading interest gives no indication of departing immediately from its present prices.

An Ohio maker of tin plate, in an effort to secure sufficient business upon which to resume operation, is reported to have gone as low as \$4.65 per base box, Pittsburgh, on production plate.

The dealers' boom in scrap seems to have collapsed for want of support in the shape of consumptive buying and the coke market, though slightly higher, does not act very strong at the advance.

Pig Iron.—The past week has been even quieter than the one before, with sales almost entirely of carload lots and inquiries few and unimportant. It is impossible to make any change in prices, and there is considerable doubt that the prospective freight rate reduc-

tion on ore will have any effect upon prices. Theoretically, Valley furnace would save 50c. per ton on pig iron and Pittsburgh district furnaces 70c. on the proposed freight reduction, but actually there will be no saving, except for one or two furnaces, because practically all of the ore that will be needed the rest of the year already has moved down from the Lake Erie docks. It was estimated, when freight rates were advanced, Aug. 26, 1920, that the cost of making a ton of pig iron was increased from \$1.50 to \$2 per ton, and if rates on coke and limestone were put back to where they were prior to Aug. 26, 1920, the saving would merely reduce the losses of the furnaces and still make iron unprofitable at the new costs and selling prices. Adrian furnace, Dubois, Pa., goes into blast next Saturday.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$19.25 to \$20.00
Bessemer	20.00
Gray forge	20.00
No. 2 foundry	21.00
No. 3 foundry	20.50
Malleable	20.50

Ferroalloys.—A fair amount of interest still is noted in 50 per cent ferrosilicon and sales of about 500 tons, mostly in carload lots, recently have been made. The market on this material, however, is weaker than it was and while one or two carloads have been moved at \$60 furnace, freight allowed, a more attractive price has been named against the bulk of the business. The quotable range now is \$57 to \$60, delivered into the Pittsburgh and nearby districts. The market on foreign ferromanganese seems to have settled definitely to a basis of \$60, delivered to Pittsburgh and nearby districts. Besides the recent sales at that price, material now is being offered at \$60, delivered Youngstown. That price means \$53.28 at the Atlantic seaboard since the freight and tax is \$6.72. The freight from the seaboard, plus tax, to Pittsburgh is \$5.40 and on a basis of \$60 delivered the seaboard price would be \$54.60. A quotation of \$55 at seaboard, on English material, has been made by agents of one maker. Interest still is small in spiegeleisen.

We quote 78 to 82 per cent domestic ferromanganese at \$60 to \$65 delivered; 78 to 82 per cent foreign ferromanganese, \$53.28 to \$55, c.i.f. Atlantic seaboard. We quote average 20 per cent spiegeleisen at \$30 to \$32, delivered, Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$60, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$23.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Youngstown makers of sheet bars have announced a further advance of \$2 a ton, effective Oct. 15, to \$34, coincident with an advance of \$5 a ton in finished sheets. There is a fairly good business in sheet bars, but the bulk of the shipments carry a price of \$29 or \$30 and the advance to be made Oct. 15, generally is regarded as an attempt to drive in business at the recently established price of \$32. All makers lately have been quoting that price, but not getting much business. Demand for soft and forging billets and slabs remains extremely limited and current quotations find little basis in sales.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$29 to \$30; 2 x 2-in. billets, \$30 to \$32; Bessemer and open-hearth sheet bars, \$30 to \$32; slabs, \$30 to \$31; forging billets, ordinary carbons, \$35, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The price of \$41 for the base size of soft rods still remains an asking, rather than a selling, price. Most manufacturers of wire products have rod mills and can make rods cheaper than \$41, while other consumers appear to be covered by contracts placed at a lower figure. That price has been materially shaded on export business and it is probable that a new domestic order of attractive proportions could be placed for less. Prices are given on page 978.

Structural Material.—Structural awards to the shops in this district, outside of small jobs, have been nil the past week. However, the numerous awards of the previous week are bringing some business in plain material, due to the fact that the fabricating companies have used up practically all of their reserve stocks. The quotation of 1.75c. on structural

steel is merely an asking price and the quotable market is right around 1.60c. Prices given on page 978.

Plates.—The effort to establish a base of 1.75c. so far has not been successful. The mills have been trying to accumulate a backlog and are known to have gone as low as 1.55c. on lots as small as 300 tons. The market, as far as sales are concerned, is quotable from 1.55c. to 1.60c. on plates of tank quality and for structural projects it is reported that together with shapes and bars, business has been booked as low as 1.50c.

We quote sheared plates, 1/4 in. and heavier, tank quality, at 1.50c. to 1.65c. f.o.b. Pittsburgh.

Wire Products.—Specifications against orders are reported to be coming along satisfactorily, but new business is not keeping pace with completed orders and the prices established several weeks ago do not find very much basis in sales.

We quote wire nails at \$2.90 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.60 base per 100 lb., Pittsburgh.

Steel Rails.—The railroads served with rails from mills in this district are making a fair number of releases. Edgar Thomson works of the Carnegie Steel Co. is operating about 50 per cent of capacity and is reported to have sufficient specifications to keep going at this gait for the next six weeks. The Midvale Steel & Ordnance Co. has received a release on a fair-sized tonnage from the Pennsylvania Railroad and started up its rail mill at Johnstown, Pa., this week. Activity still is lacking in light sections. Makers of standard sections have a considerable advantage on costs in turning out light rails over those who roll them from cold billets. It is possible for the former to convey standard rail crops to light rail mills and roll without reheating and this is being done by some makers. The regular quotation on light rails rolled from billets is 1.75c., base, for 25 to 45-lb. sections, but demand is so light and competition for business so keen that 1.70c. rarely is exceeded. Rails rolled from old sections can be bought at 1.60c., base.

We quote 25 to 45-lb. sections, rolled from new steel, 1.70c. to 1.75c. base; rolled from old rails, 1.60c. base; standard rails, \$45 per gross ton mill for Bessemer and \$47 for open-hearth sections.

Spikes and Track Bolts.—The Big Four Railroad is seeking bids on 5000 kegs of standard spikes. This constitutes the only important inquiry now before makers, although the railroads are buying small lots fairly frequently. As a sales price, \$2.50 per 100 lb. base, has disappeared, and \$2.30 to \$2.40 is more representative of the present market. Small spikes can be bought as low as \$2.50 per 100 lb., base, and \$2.75, still quoted by some makers, is merely an asking price. Makers of track bolts in this district are not getting many orders. Prices are given on page 978.

Hot-rolled and Cold-rolled Strips.—Business with most makers is better than it has been, but there still remains considerable room for improvement. The common range on hot-rolled strips is 2.15c. to 2.25c., but on some sizes where the extras run large, a base price of 2c. has been accepted. Cold-rolled strips are quotable from 3.75c. to 4c. base, but the higher figure is obtainable only on small lots.

Iron and Steel Bars.—There are admissions now that some business in merchant steel bars has been taken as low as 1.50c., base, Pittsburgh, and the impression is common among buyers that this price can be done again. This price is not being made on small lots, against which most mills are holding out firmly for 1.60c. and 1.65c. The quotation of 1.65c. finds little, if any, basis in sales. No big orders are coming out for reinforcing bars and demand for iron bars is limited.

We quote steel bars rolled from billets at 1.50c. to 1.65c.; reinforcing bars, rolled from billets, 1.50c. to 1.65c. base; reinforcing bars, rolled from old rails, 1.50c.; refined iron bars, 2.15c. to 2.25c. in carloads, f.o.b. mill, Pittsburgh.

Iron and Steel Pipe.—Steady demand is noted for merchant pipe, but interest in oil country goods still is lacking and few makers expect improvement in the latter direction during the remainder of the year. The fact that there has been a substantial rebound in crude oil prices from the extreme low point, however, is expected to stimulate drilling next year. Some line

pipe inquiries are coming out and since such business is highly desirable, the mills are not paying much attention to established quotations to get orders. Discounts are given on page 978.

Steel Skelp.—There still are more sellers than buyers and such business as is going upon the books of makers is at prices ranging from 1.60c. to 1.65c for pipe skelp. Plate-making capacity so far exceeds present demands for that product that those companies with idle mills are seeking business in other fields.

Sheets.—Some of the Youngstown independents have notified their customers that, effective Oct. 15, there would be another advance of \$5 per ton in prices, but since this move is generally regarded as an effort to give basis to present prices, the response has been poor. There is no indication that all makers will advance prices while the American Sheet & Tin Plate Co. is selling at 3c. base for black, 4c. base for galvanized and 2.50c. base for blue annealed. These prices are finding some basis in sales but buyers are not placing big tonnages at these figures and the bulk of the shipments are moving at \$5 per ton less. The American Sheet & Tin Plate Co. this week is scheduling about 93 per cent of its sheet mills, but there has been a slight decrease in the number of active independent units. Prices are given on page 978.

Tin Plate.—A fairly good business still is coming out in tin plate for other than perishable food containers and mill operations are well up to the recent average. The schedule of the American Sheet & Tin Plate Co. has been cut 3 per cent to 62 per cent, but the Standard Tinplate Co., Canonsburg, Pa., has put on three additional mills, now having 19 of its 24 mills in operation. The market still is quotable at \$5.25 per base box for production plate, although this figure was materially shaded for a brief period recently by an Ohio maker who, in endeavoring to secure enough business to start up his plant, took orders at prices ranging from \$5.10 down to \$4.65. Stock tin plate is quotable from \$4.50 to \$4.75.

Hoops and Bands.—Demand is small and prices rather poorly defined. Almost all makers are quoting hoops at 2.25c. and some are naming that price on bands also. On the heavier gages of bands, some are basing prices on the bar card and this results in a price of around 2c. for this kind of material.

Cold-Finished Steel Bars and Shafting.—Business in these products still is laggard and buyers have a good deal to say as to prices. The old base of 2.40c. for cold-rolled or drawn screw stock and shafting has disappeared and most makers now are trying to maintain a base of 2.25c., Pittsburgh, since hot-rolled bars do not seem available much below 1.60c., base Pittsburgh, and this leaves a differential of only \$13 per ton, as compared with \$25 during the war and even more during the early part of 1920. The market is quotable at 2.20c. to 2.25c., as some makers have gone to the former figure to get carload orders. Ground shafting still is quoted at 2.75c., base mill, for carload lots.

Nuts, Bolts and Rivets.—The situation has not improved materially as to business, but manufacturers have found that sales are not to be developed by constantly cutting prices and there is more stability to quotations because of the decrease in selling pressure. Manufacturers in this district, largely dependent upon the railroads for business, feel that large orders are not far off. This is due to the belief that the railroads would not have asked permission to reduce freight rates on ore and other basic materials, if their condition, with regard to finances, was not looking upward. Prices and discounts are given on page 978.

Coke and Coal.—Contracts for furnace coke for last quarter delivery, aggregating about 30,000 tons per month, recently have been closed, and since this business, together with that previously booked, about absorbs present production, the market has a fairly firm tone. Producers generally are asking \$3.50 for either spot or future shipments, but this is 10c. to 15c. per ton above what actually is being done. The market is quotable from \$3.35 to \$3.40 per net ton oven. Such blast furnaces as are in operation are covered by contracts and the spot market consequently is a very

limited one, with most of the lots which are coming on the market going to other than blast furnaces. There seems to be no excess supply of foundry coke and strictly standard grade no longer is available at less than \$4.50, while some business is being done at \$4.75. There are reports of \$5 foundry coke, but such prices are being done in markets ordinarily served from by-product plants, or other coke districts than Connellsville, and \$5, Connellsville, is low by comparison. Not much activity is noted in coal and prices do not change much. Mine run steam coal of the best grade is quotable at \$1.75 to \$1.85, by-product \$1.90 to \$2.10, and gas coal from \$2.25 to \$2.75. The fuel interests are beginning to talk car shortages and the possibility of a miners' strike next spring, in an effort to stimulate business. Here and there car shortages have developed, but it is because the railroads are not using the cars they have in stock and the shortages are not important.

Old Material.—The most recent advances in prices appear to have largely snuffed out such demand as lately existed, and while dealers are holding rather firmly to the advance, they have not succeeded in doing much business. It is learned that some consignments of heavy melting steel recently rejected on the ground of quality by one steel maker in this district, and then re-consigned to another melter, also have been rejected by the latter. A dealer here who recently secured some railroad steel of high grade at around \$14.75 delivered, Pittsburgh, was unable to turn it over within the time allowed by the railroad to move it and was obliged to throw the tonnage down on his yards. It looks as though the recent advance was a little too rapid, for melters and dealers who paid the high prices now find it necessary to sit back and wait for melters' price ideas to move upward.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$14.00 to \$14.50
No. 1 cast cupola size.....	17.50 to 18.00
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	16.00 to 17.00
Compressed sheet steel.....	12.00 to 12.50
Bundled sheet sides and ends, L.O.B. consumers' mills, Pittsburgh dist.....	10.50 to 11.00
Railroad knuckles and couplers.....	15.00 to 15.25
Railroad coil and leaf springs.....	15.00 to 15.25
Low phosphorus melting stock, bloom and billet ends, heavy plates, 1/4-in. and thicker.....	17.50 to 18.00
Railroad malleable.....	13.00 to 13.50
Iron car axles.....	20.00 to 21.00
Locomotive axles, steel.....	19.50 to 20.00
Steel car axles.....	15.00 to 15.50
Cast iron wheels.....	16.00 to 16.50
Roller steel wheels.....	15.00 to 15.50
Machine shop turnings.....	9.50 to 10.00
Sheet bar crop ends at origin.....	13.50 to 14.00
Heavy steel axle turnings.....	11.50 to 12.00
Short shoveling turnings.....	10.50 to 11.00
Heavy breakable cast.....	15.00 to 15.50
Stove plate.....	13.00 to 13.50
Cast iron borings.....	10.00 to 10.50
No. 1 railroad wrought.....	13.00 to 13.50

Iron Ore Shipments in September

The gap between the iron ore movement from Lake Superior in 1921 and that of 1920 was widened in September. Shipments down the Lakes last month amounted to 3,913,122 gross tons, whereas in September, 1920, the total was 8,923,482 tons. The falling off was thus 56 per cent. The total by ports, the season's shipments, and a comparison with 1920 are given below:

	September		To Oct. 1—	
	1921	1920	1921	1920
Escanaba	556,158	1,088,806	1,314,331	5,483,644
Marquette	196,697	493,311	459,802	2,634,602
Ashland	418,620	1,253,633	1,847,928	6,187,035
Superior	668,570	2,330,512	4,177,498	11,291,936
Duluth	1,503,237	2,304,726	7,975,877	11,656,866
Two Harbors	569,840	1,452,494	2,885,758	7,019,273
Total	3,913,122	8,923,482	18,661,194	44,273,356

To Oct. 1 the season's movement was 18,661,194 tons, as against 44,273,356 tons to Oct. 1, 1920, the falling off being 25,612,162 tons, or about 58 per cent.

The Burt Mfg. Co., Akron, Ohio, has just made shipment of 21 Burt ball bearing revolving ventilators and bases made of cold rolled copper for use of the Navy Department at Pearl Harbor, H. I.

New York

NEW YORK, Oct. 10.

Pig Iron.—Following recent sales of considerable size, the foundry iron market is very dull, but there are no indications of weakness except perhaps in the Buffalo district where it is apparent that the \$20 base can be shaded. Furnaces in the East are not greatly interested in the reduction of 28 per cent in ore carrying rates, as they are well supplied with ore. The action may have the effect of causing more hesitation on the part of buyers of pig iron on account of the possibility of lower pig iron prices due to reduction in costs. No material reductions, however, will be brought about unless the reduction in ore carrying rates is followed by similar reductions on other materials and also on ore for delivery after Jan. 1, 1922.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25..	\$24.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25..	23.02
Buffalo, sil. 1.75 to 2.25.....	25.46
No. 2 Virginia, sil. 1.75 to 2.25.....	29.16

Ferroalloys.—The market continues quiet. Domestic producers are meeting foreign competition as may be necessary in individual cases, but have no definite selling price. Foreign ferromanganese is available at about \$60, delivered, to steel plants as far West as the Pittsburgh district. Spiegeleisen is quoted from \$25 to \$26, furnace.

Ferroalloys

Ferromanganese, domestic, delivered, per ton.	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton	\$25.00 to \$26.00
Ferrosilicon, 50 per cent, delivered, per ton.	\$60.00 to \$65.00
Ferrotungsten, per lb. of contained metal.	48c. to 58c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr.....	14c.
Ferrovandium, per lb. of contained vanadium	\$4.50

Ores

Manganese ore, foreign, per unit, seaboard	20c.
Tungsten ore, per unit, in 60 per cent concentrates	\$3.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude per net ton, Atlantic seaboard....	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude per net ton, Atlantic seaboard.....	\$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.....	55c. to 60c.

Finished Iron and Steel.—Business as a whole has kept up on the plane of recent weeks and is, therefore, better than it was in the summer months, but is not yet in sufficient volume to keep mills well engaged. The result is that prices for the heavier tonnage products have not stiffened and intense competition follows on attractive offerings. For example, one price on a round tonnage of concrete reinforcing bars is equivalent to about 1.45c., Pittsburgh. On 1900 tons of plates a price is claimed of 1.70c., Philadelphia. It remains that 1.60c., Pittsburgh, is still a possible price on a sizable lot. One of the biggest new projects involves 20,000 tons of plates for a pipe line for New York. Bids on twin 108 ft. stand pipes for New Braunfels, Tex., either two of 500,000 gal. capacity or one of 1,000,000 and the other of 800,000 gal., are to be received on Nov. 10; M. L. Diver, consulting engineer, San Antonio, Tex., has the plans and specifications. For the new roadway on the Manhattan Bridge involving 1500 tons, mostly plates, the Vulcan Rail & Construction Co., Maspeth, L. I., is low bidder at \$259,600. The Delaware, Lackawanna & Western Railroad, which recently informed car builders that it would place orders for freight cars to aid in the recovery of business if sufficiently attractive prices were quoted, has bought 1500 50-ton steel hopper cars at prices said to be just about enough to cover costs of labor and material. The cars were divided equally among the Cambria Steel Co., Standard Steel Car Co. and the American Car & Foundry Co. About 17,500 tons of steel will be required. Other railroad orders mostly involve repairs on wood cars. The Lehigh Valley has contracted with the American Car & Foundry Co. for the repair of 1000 wood box cars and the Pittsburgh & Lake Erie has placed 500 wood box cars for repairs with the Pressed Steel Car Co. A

moderate volume of new structural steel work is coming up for bids, the following projects having become active during the week: 500 tons for Terre Haute, Ind., plant of American Car & Foundry Co.; 300 tons for a warehouse for a casket company in Brooklyn; 400 tons for an office building in Syracuse, N. Y.; 500 tons for cranes at Staten Island city piers. The American Bridge Co. has taken the following work: 300 tons for a power house at Scranton, Pa.; 500 tons for a bridge across the Delaware River. The Belmont Iron Works, Philadelphia, has been awarded 150 tons for a pier for the Philadelphia & Reading Railroad.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.98c. to 2.03c.; plates, 1.98c. to 2.13c.; structural shapes, 1.98c. to 2.13c.; bar iron, 1.98c. to 2.03c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Warehouse Business.—There is a continued increase in volume of business, the tendency of buyers being to place heavier tonnages than formerly. In sheets, galvanized are extremely stiff and although 5c. per lb. base is still the prevailing price some dealers in small lots are quoting as high as 5.25c. per lb. Cold rolled shafting, which is now on a 4.03c. per lb. base, is generally expected to show a decline of about 50c. per lb. before long. Copper quotations are up ½c. per lb. and dealers report a slight improvement in buying. The new schedule of warehouses on lapwelded and seamless steel boiler tubes runs as follows:

Lapwelded: 1¾ in., —3; 2 in. and 2¼ in., —22; 2½ in. to 3 in., —35; 3¼ in. to 4½ in., —42.
Seamless: 1½ in., —35; 1¾ in., —12; 2 in. and 2¼ in., —19; 2½ in. to 2¾ in., —24; 3 in., —29; 3¼ in. to 4 in., —35.

We quote other prices on page 990.

High Speed Steel.—The market continues dull with the few orders that appear confined to a few pounds. Producers quote 90c. to \$1 per lb. for 18 per cent tungsten high speed steel.

Old Material.—More activity is reported by most dealers and there is an upward tendency to prices. Buying prices per gross ton on heavy melting steel, New York, are now about \$8. A holiday last week and another one this week have been the cause of some dullness in the market. Slightly more activity is noted in the Pittsburgh district.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$7.50 to \$8.00
Steel rails, short lengths, or equivalent	9.00 to 9.50
Rerolling rails	11.50 to 12.00
Relaying rails, nominal	37.50 to 40.00
Steel car axles	11.50 to 12.00
Iron car axles	19.00 to 20.00
No. 1 railroad wrought	12.00 to 12.50
Wrought iron track	9.50 to 10.00
Forge fire	6.00 to 6.50
No. 1 yard wrought, long	10.50 to 11.00
Light iron	4.50 to 5.00
Cast borings (clean)	5.50 to 6.00
Machine-shop turnings	4.00 to 4.50
Mixed borings and turnings	3.50 to 4.00
Iron and steel pipe (1 in. diam. not under 2 ft. long)	9.00 to 9.50
Stove plate	10.00 to 10.50
Locomotive grate bars	10.00 to 10.50
Malleable cast (railroad)	8.50 to 9.00
Car wheels	12.00 to 12.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	\$17.00 to \$18.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.00 to 16.00
No. 1 heavy cast, not cupola size	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Boston

BOSTON, Oct. 11.

Pig Iron.—The feature of the week was the inquiry of a large textile machinery manufacturer in eastern Massachusetts for from 1000 to 3000 tons of 2.25 to 2.75 silicon iron, bids for which were opened Oct. 10. It has been a year and a half since this concern has bought iron and it is expected that shortly it will purchase as much as 5000 tons. A factor of interest in two recent large purchases, one of 8000 tons by a textile machinery maker and another of about 10,000 tons by a radiator manufacturer, was the low prices made by a northern furnace, whose freight is 70c. lower than that of eastern Pennsylvania. It is reported that its

price was lower than \$19, base, furnace. The stack is not in blast, but is accumulating enough orders to make blowing in worth while. Its price is now raised to \$19.50 furnace base. Eastern Pennsylvania furnaces continue to dominate the New England market and from this district it is difficult to get quotations less than \$20.50, base. There have been several sales during the week of lots of 100, 200 and 300 tons. An American agent for Belgian iron has been making a few sales in this territory at prices under the local market. The rumor that foreign iron is on a Boston dock was investigated thoroughly by a local house, the searchers finding no trace of such iron. The stove and radiator foundries appear the most active. The radiator concern which recently purchased about 10,000 tons intimates that it will need more iron in January. The more conservative pig iron authorities believe that the recent spell of buying was only a flurry and that a marked and steady improvement has not yet set in.

East. Penn., silicon 2.25 to 2.75.....	\$24.56 to \$26.06
East. Penn., silicon 1.75 to 2.25.....	24.06 to 25.56
Buffalo, silicon 2.25 to 2.75.....	25.96 to 26.49
Buffalo, silicon 1.75 to 2.25.....	25.46 to 25.96
Virginia, silicon 2.25 to 2.75.....	30.08 to 31.08
Virginia, silicon 1.75 to 2.25.....	29.58 to 30.58
Alabama, silicon 2.25 to 2.75.....	30.16
Alabama, silicon 1.75 to 2.25.....	29.66

Finished Material.—The price of 1.50c., Pittsburgh, on bars being made by one of the independent mill representatives here, has brought out considerable business within the past ten days from a variety of buyers, including makers of drop forgings, marine hardware, automobile accessories and jobbers. Consumers are evidently taking advantage of this low price, as 1.60c. is the more generally quoted figure. Generally, business improved in September over August, but the demand was not greater than would normally be expected for the first fall month. No big structural lettings took place during the week, all being under 100 tons. Structural steel can be obtained for 1.60c. and possibly 1.55c.

Warehouse Business.—Jobbers are still cutting down stocks and in many instances are not keeping a full assortment of sizes. For instance, they would shear sheets to desired width and take the waste incident thereto rather than keep exact sizes. Sheets and plates are more in demand. The call for structural material is better than it was a few weeks ago, but even now is slight. Reductions of 15c. per 100 lb. have been made on cold-rolled steel. September improved on August from the standpoint of volume of sales and material shipped.

Jobbers now quote: Soft steel bars, \$2.81½ per 100 lb. base; flats, \$3.83 to \$3.93; concrete bars, \$2.50 to \$3.09; tire steel, \$4.20 to \$4.70; spring steel, open hearth, \$5.25; crucible, \$11.50; steel bands, \$3.46½ to \$3.98; steel hoops, \$4.18; toe calk steel, \$5.25; cold rolled steel, \$3.90 to \$4.30; structural steel, \$2.81½ to \$2.96½; plates, \$2.91½ to \$3.10; No. 10 blue annealed sheets, \$3.73; No. 28 black sheets, \$4.25; No. 28 galvanized sheets, \$5.25; refined iron, \$2.83 to \$4.75; best refined, \$4.75; Wayne iron, \$6.50; Norway iron round, ½-in. to 2½-in., 5.75c. to 6.75c. per lb. net; other sizes, 7.75c. base.

Coke.—The long-expected increase in demand is upon the coke trade and, though not spectacular, is fairly satisfactory. Local producers of by-product coke state that an increasing of prices on Nov. 1 is rather expected in view of the increasing prices in the Connellsville district. Present buying is chiefly to insure a sufficient supply when the snow flies, though at the same time the foundries have generally increased their melt. The present price is \$10.66, delivered where the local freight does not exceed \$3.40.

Cast-Iron Pipe.—The public bidding on pipe for West Springfield and Malden, Mass., last week has established lower market prices on the larger sizes. We are reducing our quotations below, therefore, by \$1 a ton on 6-in. to 10-in. inclusive. An interesting feature was the bids submitted by an Alabama pipe maker, which were close to the lowest bidder in spite of the high freight rates. The city of West Springfield, which originally asked for 1100 tons of 16-in. pipe, revised bids to 435 tons of the same size. The Donaldson Iron Co., Emos, Pa., was low bidder at \$43.70 delivered, the highest bid having been \$48. J. B. Clow & Sons, Springfield, Ill., caused surprise because of the long distance to its plant by being low bidder for 60 tons of 6-in. and 8-in. pipe for Malden, Mass., with a delivered

price of \$49.50. The highest bid was \$50.20. Turners Falls, Mass., which originally was planning to extend a 16-in. water main a mile and a quarter, will postpone buying on this until next year. However, it is planning to purchase this fall 800 ft. of 8-in. pipe and 600 ft. of 6-in. pipe (about 50 tons total). Lawrence, Mass., will open bids Oct. 13 for 800 ft. of 8-in. pipe. Norwood, Mass., has bought 125 tons of 18-in. pipe for a new sewer line. We quote per net ton in carload lots, f.o.b. Boston and district, as follows: 3-in., \$66.70; 4-in., \$56.70; 6-in., \$50.70; 10-in. and larger, \$49.70.

Old Material.—The better feeling is the result of more activity on the part of brokers buying from dealers than from interest shown by mills for scrap. Local dealers have been offered \$15 for heavy melting steel, delivered, by mills in the Pittsburgh district, but the high freight and the danger of rejections prevent much from being shipped from here. Borings and turnings have advanced in price because of more demand in the eastern Pennsylvania district. Local foundries are getting bargains in cast scrap, at prices which are really below the present market.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	\$18.50 to \$20.00
No. 2 machinery cast	16.50 to 17.50
Stove plate	15.50 to 16.50
Railroad malleable	13.50 to 14.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$7.00 to \$7.75
No. 1 railroad wrought	10.00 to 10.50
No. 1 yard wrought	8.00 to 8.50
Wrought pipe (1-in. in diameter, over 2 ft. long)	8.00 to 8.50
Machine shop turnings.....	3.50 to 4.00
Cast iron borings, rolling mill.....	4.00 to 4.75
Cast iron borings, chemical.....	4.50 to 5.00
Blast furnace borings and turnings.....	2.50 to 2.75
Forged scrap and bundled skeleton ..	4.50 to 5.00
Street car axles and shafting.....	12.00 to 13.00
Car wheels	13.00 to 14.00
Rerolling rails	9.00 to 10.00

Buffalo

BUFFALO, Oct. 12.

Pig Iron.—With two pig iron producers out of the market and likely to be for the remainder of the year, sales in this district will show a decided slump. Less than 5000 tons of new business was booked last week. An interest which has a furnace blowing on foundry iron will blow in another on basic Oct. 15, but none of this production will be offered for sale; the entire turnout will be used in steelmaking. The \$21 base prevails more generally. One interest sold 400 tons at this figure. The interest which sold 2000 tons booked the foundry iron at \$20 and malleable lots at \$21. They have inquiries for 6000 tons on which they quoted the same scale. The furnace which has sold its entire estimated capacity of foundry iron for the rest of the year turned down about 6000 tons within a few days.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$21.00 to \$22.00
No. 2X foundry, 2.25 to 2.75 sil.....	20.50 to 21.50
No. 2 plain, 1.75 to 2.25 sil.....	20.00 to 21.00
Basic (nominal)	21.00
Malleable	21.00 to 22.00
Lake Superior charcoal.....	31.75

Finished Iron and Steel.—The margin of improvement is not great, but the increase in the number of orders with betterment in quantities asked for is satisfactory. Tin plate and pipe continue to be the best-moving commodities and some slight increase in structural business is noted, but it is generally conceded that whatever awards are made in this field will not be for this year's delivery. Plans are under way for the construction of a six-story structure in Buffalo by D. H. Coplon wherein the structural requirements will be 1600 tons and reinforced bars 300 tons. The Kellogg Structural Steel Co. will fabricate 300 tons for an addition to the J. N. Adam hospital at Perrysburg, N. Y. Increased railroad shop operation here and in nearby railroad centers has not developed any unusual demand. The Pennsylvania shops at Olean, N. Y., and the New York Central shops at Depew, N. Y., are now approaching normal capacity. In some quarters a belief is expressed that stronger prices will follow the sheet

advance. Tin plate is now quoted at \$5.25 per base box. Plates are quiet, but bars show an increase in demand. Mill operation with one interest which never exceeded 15 per cent at any time this year is now at 30 per cent.

Warehouse Business.—Some new business is noticed in the general improvement. Some shops have been in the market and while no large buying has resulted, the pick-up is definite and from a constantly increasing circle of buyers. Improved railroad shop operation has not been felt in warehouse circles to any marked extent and jobbers generally feel that railroad wants in connection with car building and repairing have been handled at mills.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.90c.; plates, 2.90c.; plates, No. 8 gage, 3.25c.; soft steel bars and shapes, 2.80c.; hoops, 3.50c.; blue annealed sheets, No. 10, 3.55c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 6.40c.; cold-rolled round shafting, 3.95c.

Coke.—Some fair sales have been made and best grades are now quoted at \$4.50 to \$5.50. Inquiry has also shown improvement.

Old Material.—An advance in prices with particular reference to heavy melting steel is anticipated by a number of dealers who are now reluctant to accept business at \$13. Considerable trading is going on between dealers and a number of mills have made purchases of steel. No large tonnage has moved and orders call for less than 500 tons. Generally demand for all grades has improved.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$13.00 to \$14.00
Low phos., 0.004 and under	16.00 to 17.00
No. 1 railroad wrought	13.00 to 14.00
Car wheels	14.00 to 15.00
Machine shop turnings	6.00 to 7.00
Cast iron borings	6.00 to 7.00
Heavy axle turnings	9.00 to 10.00
Grate bars	10.50 to 11.00
No. 1 busheling	10.00 to 11.00
Stove plate	13.00 to 14.00
Bundled sheet stampings	7.00 to 8.00
No. 1 machinery cast	16.00 to 17.00
Hydraulic compressed	10.00 to 10.50
Railroad malleable	12.00 to 13.00

Cleveland

CLEVELAND, Oct. 11.

Iron Ore.—Rail freight rates on ore from both lower lake ports and the seaboard will be reduced 28 per cent Oct. 20, the reduction to remain in effect until Jan. 1. Ore firms to-day were advised by the ore carrying railroads that the Interstate Commerce Commission had approved their application for the reduction and that the new tariffs are now being prepared, making the reduction effective on the date named. The reduction will result in the saving of 75c. per ton in the cost of making pig iron in the Pittsburgh district and 56c. in the Youngstown district, figuring two tons of ore for a ton of pig iron. While ore men regard the reduction in freight rates a move in the right direction, they are of the opinion that the lower rates will have little effect in the way of reducing the cost of making pig iron for some time, in view of the fact that the ore shipping season is almost over and furnaces generally, having bought sparingly, have taken nearly all the ore they have purchased directly to their furnace yards and now have in their stock piles nearly all the ore they will require until next spring. The rate cut will work to the earlier advantage of some furnaces that have gone in blast recently and will take considerable ore off the docks and it is expected to stimulate the dock movement in the next few weeks, as consumers will probably take shipments from docks instead of waiting until during the severe winter weather when the handling of ore is more expensive. The immediate effect of the announcement of the rate reduction is numerous requests from consumers that shipments be held up so that they can take advantage of the lower rail rates. Shippers are finding it impossible to grant many of these requests, although where it can be done they are diverting cargoes from inland furnaces to lake front furnaces which will not be benefited by the lower rail rates. One or two Eastern consumers have asked that

their ore be placed on docks instead of being shipped direct as the greater saving in the reduced freight rates on ore for Eastern points as compared with the Pittsburgh and Valley districts results in a substantial saving for the consumer even after paying the dock handling charge. The rail rate reduction is not expected to stimulate the market to any extent, although it has caused one consumer to revive an inquiry which had become inactive.

Ore Receipts.—Ore receipts at Lake Erie ports during September were 2,670,172 gross tons as compared with 7,455,979 tons during September, 1920. Receipts at these ports for the season to Oct. 1 were 13,078,054 tons as compared with 31,959,201 tons during the same month last year. Shipments from Lake Erie docks to inland furnaces during September were 1,727,391 tons as compared with 5,596,554 tons during September last year, and the shipments from these docks for the season until Oct. 1 were 9,569,727 tons, as compared with 23,222,770 tons during the same period a year ago. During September the amount of ore on Lake Erie docks increased 375,657 tons, being 9,661,365 tons on Oct. 1, as compared with 9,203,206 tons on the same date last year.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—Sales were lighter during the week than for several previous weeks. One interest sold 4100 tons, practically all in foundry grades, and including one 1000-ton lot placed by an Ohio jobbing foundry. Sales by other producers were in small lots. Shipments are holding up well, being about the same as during September. No change has developed in the price situation. Lake furnaces still quote foundry iron at \$20 to \$21 for No. 2, the former price being the more general quotation except for nearby points where the furnace has a freight advantage. While the usual minimum quotation for foundry iron for Cleveland delivery is \$20.50, the sale of a 200-ton lot at \$20 is reported. The only inquiry of any size is for 1000 tons of 2.75c. to 3.25c. silicon iron from an Elwood City, Pa., consumer. Prospects of reduction in freight rates are not expected to have any effect on pig iron sales and shipments, as consumers are taking iron only as fast as they need it.

Quotations below are f.o.b. local furnace for northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.95 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$21.21
Northern No. 2 fdy., sil. 1.75 to 2.25	\$20.50 to 21.00
Southern fdy., sil. 2.25 to 2.75	26.17
Ohio silvery, sil. 8 per cent	32.86
Standard low phos., Valley furnace	35.00

Finished Iron and Steel.—The volume of new business fell off the past week and orders generally were for small lots. On steel bars, a 1.50c. price which was in evidence a few weeks ago has again appeared, but 1.60c. is the most common minimum quotation. On plates and structural material, 1.65c. is the ruling quotation by some of the mills, while others are adhering to 1.75c. Some consumers have taken protections on plates and shapes at 1.65c. and some are closing contracts at this price for the remainder of the year. A lake shipyard has placed 1400 tons of plates for repairing lake boats and Ohio shops are figuring on oil storage tanks and refinery work that will require considerable plate tonnage. Cleveland will re-advertise for bids for the Baldwin Reservoir, requiring 1700 tons of reinforcing bars, this work having been held up some time by court proceedings. Quotations on hard steel bars range from 1.55c. to 1.60c. A Detroit automobile manufacturer is inquiring for 600 tons of cold-rolled steel. Light rails are weak. One sale is reported at 1.65c. with the extras waived. A lull has developed in the building field, no new work having come out during the week.

Jobbers quote steel bars, 2.64c.; plates and structural shapes, 2.74c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 black annealed sheets, 3.10c.; hoops and bands, 3.29c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Sheets.—One valley mill has advised its trade that it will advance sheets \$5 a ton Oct. 15, or earlier, and is taking some orders for October and November delivery at present prices. This advance will not apply to the heavier gages of blue annealed sheets, which it will continue to quote at 2.25c., or \$5 a ton lower than the present regular price on the lighter gages. Prices seem well maintained at 3c. for black and 4c. for galvanized sheets. Sales include 1000 tons of blue annealed sheets to a Detroit automobile manufacturer.

Warehouse Business.—Warehouse orders show some improvement, but irregularities in prices appear to have become more numerous.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is gaining and the market has stiffened up, makers claiming that concessions from regular prices have about disappeared. Manufacturers are declining to make contracts at present prices, which they say are below the cost of production and some are talking of on advance. The demand for rivets is slow and the market is still weak. While 2.40c. for structural and 2.50c. for boiler rivets are the more common quotations, these prices are being shaded \$2 a ton.

Coke.—Foundry coke in small lots is in fair demand and the market is firm at \$4.50 to \$4.75 for standard Connellsville makes for prompt shipment. Some producers are asking \$5 for November and December shipments. Sales of West Virginia foundry coke are reported at \$6.

Old Material.—There is a fair volume of activity on the part of dealers who are buying scrap to fill orders recently taken from Youngstown mills. Prices are firm and some grades are higher, particularly cast iron borings. As the local market is lifeless, prices on active grades are still based on the Youngstown market. Sales of machine shop turnings to dealers for Youngstown delivery are reported at \$8.50 to \$9, cast, iron borings at \$10.50 to \$10.75 and heavy melting steel at \$14 to \$14.25.

We quote per gross ton delivered consumers' yards in Cleveland and vicinity as follows:

Heavy melting steel	\$12.00 to \$12.50
Steel rails, under 3 ft.	12.75 to 13.25
Steel rails, rerolling	15.00 to 15.50
Iron rails	11.00 to 12.00
Iron car axles	18.00 to 19.00
Low phosphorus melting scrap	12.50 to 13.00
Cast borings	8.40 to 8.65
Machine shop turnings	6.50 to 7.00
Mixed borings and short turnings	7.00 to 7.50
Compressed steel	9.25 to 9.75
Railroad wrought	12.00 to 12.50
Railroad malleable	12.00 to 12.75
Light bundled sheet stampings	6.00 to 6.50
Steel axle turnings	9.25 to 9.75
No. 1 cast	16.00 to 16.50
No. 1 busheling	7.50 to 8.00
Drop forge flashings, over 10 in.	7.00 to 7.50
Drop forge flashings, under 10 in.	7.00 to 7.50
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	7.50 to 8.00

St. Louis

St. Louis, Oct. 11.

Pig Iron.—The melt of pig iron in this district is still on the increase and there is more buying. However, during the last week there was no outstanding sale of consequence, but the run of carload orders showed an improvement. The largest inquiry put out was for 800 tons, made up of 550 tons of foundry iron and the remainder off Bessemer. A central Illinois implement manufacturer bought 200 tons. A car of 50 per cent ferrosilicon was purchased by a manufacturer in this district. The market is firm and prices are being well maintained.

We quote delivered consumers' yards St. Louis as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	\$24.88
Northern malleable, sil. 1.75 to 2.25	24.88
Basic	24.88
Southern foundry, sil. 1.75 to 2.25	24.91

Finished Iron and Steel.—Local fabricators, who last week saw the order for 3600 tons of structural steel for the hangar at Belleville, Ill., go to a Pittsburgh concern, lost another contract this week, the 2000-ton structural job for the Scottish Rite Cathedral

going to the American Bridge Co., which was the lowest of three bidders. The letting of the contract for the Federal Reserve Building, about 3000 tons of structural steel, will be delayed about two months. Railroad purchases are being confined to wheels, axles and other material needed for car repairs, but in small quantities. There is a lull in the buying of sheets, most jobbers having protected themselves by purchases before the recent advance became effective. Warehouse prices are unchanged, and only a fair volume of business is being done.

For stock out of warehouse we quote: Soft steel bars, 2.87½c. per lb.; iron bars, 2.87½c.; structural shapes, 2.97½c.; tank plates, 2.97½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.10c.; cold drawn rounds, shafting and screw stock, 4.20c.; structural rivets, \$3.77½ per 100 lb.; boiler rivets, \$3.87½; tank rivets, 7/16 in. and smaller, 60-10 per cent off list; machine bolts, large, 55 per cent; small, 60 per cent; carriage bolts, large, 50-5 per cent; small, 55 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, \$3.25; and tapped, \$3.00 off list.

Coke.—The market for coke is firm at \$4.75 to \$5.50 for Connellsville brands, which is being met by local by-product producers. The tendency is toward the higher levels. An inquiry for 7500 tons of foundry coke, mentioned in THE IRON AGE last week is still pending, but no new inquiry of any considerable tonnage has developed. Sales of Granite City by-product coke during the week totaled 6000 to 8000 tons.

Old Material.—The market for old iron and steel continues strong and is very active. Some substantial purchases by consumers have been made at advanced quotations. Prices are higher by 50c. to \$1 per ton on nearly all grades. Dealers are anxiously covering their short sales and all railroad offerings were disposed of at good margins over the previous week's sales. Relaying rails are marked up about \$2 per ton and inquiries are lively, although offerings are scarce, especially in the heavier sections. The following railroad lists are before the market this week: Great Northern, 3000 tons; Missouri, Kansas & Texas, 1000 tons; Wabash, 300 tons; Pullman Co., 250 tons.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Iron rails	\$15.50 to \$16.00
Steel rails, rerolling	13.50 to 14.00
Steel rails, less than 3 ft.	13.00 to 13.50
Relaying rails, standard section	30.00 to 32.00
Cast iron car wheels	15.50 to 16.00
No. 1 heavy railroad melting steel	12.00 to 12.50
No. 1 heavy shoveling steel	11.50 to 12.00
Ordinary shoveling steel	11.00 to 11.50
Frogs, switches and guards, cut apart	12.00 to 12.50
Ordinary bundle sheet	7.00 to 7.50

Per Net Ton

Heavy axles and tire turnings	\$7.50 to \$8.00
Iron angle bars	13.00 to 13.50
Steel angle bars	11.00 to 11.50
Iron car axles	20.00 to 20.50
Steel car axles	15.50 to 16.00
Wrought iron arch bars and transoms	15.50 to 16.00
No. 1 railroad wrot.	12.00 to 12.50
No. 2 railroad wrot.	11.00 to 11.50
Railroad springs	13.00 to 13.50
Steel couplers and knuckles	13.00 to 13.50
Locomotive tire, 42-in. and over, smooth inside	10.00 to 10.50
No. 1 dealers' forge	10.00 to 10.50
Cast iron borings	7.50 to 8.00
No. 1 busheling	11.00 to 11.50
No. 1 borings cut in sheets and rings	8.00 to 8.50
No. 1 railroad cast	15.00 to 15.50
Stove plate and light cast	12.00 to 12.50
Railroad malleable	11.50 to 12.00
Agricultural malleable	10.50 to 11.00
Pipes and flues	8.50 to 9.00
Heavy railroad sheet and tank	8.00 to 8.50
Light railroad sheet	5.50 to 6.00
Railroad grate bars	10.50 to 11.00
Machine shop turnings	6.00 to 6.50
Country mixed iron	8.00 to 8.50
Uncut railroad mixed	9.00 to 9.50
Horseshoes	11.00 to 11.50
Railroad brake shoes	10.50 to 11.00

Owing to better movements of steel and tinplate, the "Tinplate Special," operated by the Erie railroad between the Youngstown district and Chicago, has been revived. Third-morning delivery at Chicago from producing points in the Valleys is assured under the new service.

Philadelphia

PHILADELPHIA, Oct. 10.

The interest of the trade centers rather on price fluctuations than upon volume or tonnage of orders. Price tendency is upward in all lines from raw to finished material, being noted most markedly in old material, in which a general advance has taken place. Generally speaking, the tonnages placed the past week have been very small. Steel sales managers are showing more determination than ever not only to maintain present prices but to raise them gradually to more nearly the cost of manufacture. They have found that lower than cost prices have not stimulated business, and so conclude they might as well raise levels. Pig iron salesmen are more and more showing buyers that their quoted prices are final. It seems as though a campaign to educate the buyer as to the economics of the present situation had set in in earnest.

Features of the week's developments are: The 28 per cent freight reduction on iron ore by all trunk lines; the statement by several sheet makers that another \$5 a ton advance is due Oct. 15; the \$5 price being made by some on foundry coke, both spot and contract.

The present freight rate on iron ore from Buffalo to eastern Pennsylvania is \$2.24 a ton; a 28 per cent reduction would bring this price to \$1.61 a ton. The 63c. reduction would theoretically mean a reduction of \$1.20 a ton on the cost of making a ton of pig iron. The pig iron trade looks upon the proposed reduction with indifference; some even say it will prove an embarrassment, as buyers will use the freight reduction as a lever to wedge down prices. Practically all of the furnaces in this district have their ore in stock, on which they have paid the present high freight. It is expected that the reduced freight schedule will be placed in effect Oct. 20. The pig iron interests had asked for a 25 per cent reduction on ore, coke and limestone, and it is said by some that this recent action is a "sop" to compensate for the failure to comply with the original request. One interesting theory is that the railroads expect to buy steel before long and feel that they can more legitimately ask for reductions on what they buy, if they themselves take the first step.

Two or three sheet makers have announced the coming advance in sheets and seem confident that it will be maintained.

There is only one large pig iron inquiry before the trade: that of a New England textile interest for up to 3000 tons of No. 2X. A 3000-ton inquiry for gray forge, announced two weeks ago, has been withdrawn. The Pennsylvania Railroad recently bought 4500 kegs of spikes and 70,000 heat-treated track bolts.

Ferroalloys.—The Brier Hill Steel Co. is in the market for 100 tons of ferromanganese. The British price is \$58.35, seaboard, and domestic producers are meeting it. There is virtually no demand for spiegeleisen. It is quoted at \$25 to \$27.

Pig Iron.—A Massachusetts manufacturer of textile machinery has spread broadcast an inquiry for 1000 to 3000 tons of No. 2X. As eastern Pennsylvania furnaces are dominating the New England market because of advantageous freight rates, they are interested particularly in this inquiry. An informal inquiry for 3000 tons of gray forge from a skelp manufacturer has been withdrawn because a pipe maker in turn withdrew its skelp inquiry. A lull has set in following the recent buying flurry. At the same time, prices are becoming stiffer. It is more difficult to obtain 1.75 to 2.25 per cent silicon iron for \$20.50 furnace. One prominent seller who last week quoted \$21, base, has raised this price 50c. It is understood that the following furnaces are considering blowing in: Brooke, Carbon and Reading. It is officially announced that the Hellertown furnace of the Thomas Iron Co. will be blown in by Oct. 15. Where favorite brands are desired, high prices have been paid in some instances. No. 2 plain has sold for \$23, furnace; 2X Virginia iron has sold at \$25, the same seller later asking 50c. more. One eastern Pennsylvania furnace advises it would not sell malleable at

less than \$24, furnace, whereas Buffalo malleable is purchaseable at \$20.50.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$21.34 to \$22.04
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.84 to 22.54
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.74
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 29.74
Basic deliv. eastern Pa.	20.50
Gray forge	20.50 to 21.50
Malleable	24.00 to 25.00
Standard low phos. (f.o.b. furnace)	36.50
Copper bearing low phos. (f.o.b. furnace)	35.00

Plates.—The most demand comes from tank makers. The Baltimore & Ohio is receiving bids Oct. 13 on car repair material. It is said on good authority that this railroad will repair 20,000 or more cars within the next few months. The price of 1.75c., Pittsburgh, is most generally named, though admission is made that concessions would be made. One company quotes 1.65c.

Structural Shapes.—The same prices are quoted as on plates, though the market on structural steel is a trifle stronger. Though bids are in, contracts have not been awarded for the 1000 tons for the school at Atlantic City nor for the 500 tons for the swing span for the Philadelphia & Reading.

Railroad Supplies.—The Pennsylvania Railroad recently purchased 4500 kegs of spikes and 70,000 heat-treated track bolts. Prices on machine bolts are stronger, makers having abandoned the 70 and 10 per cent off list price in favor of the 65, 10 and 5 per cent.

Bars.—The price of 1.65c. is generally quoted on steel bars, two makers quoting 1.60c. The price tendency is upward.

Wire Nails.—Several sales have been made by independents at the new prices of 2.90c.

Sheets.—Some business has been placed at the new prices, and the announcement has been made by several companies that another \$5 a ton advance will be made Oct. 15. The theory is that just as buyers hastened to cover before the former recent advance, so will they repeat covering for the next. Present prices are 2.50c. for blue-annealed, 3c. for black and 4c. for galvanized.

Old Material.—Three eastern Pennsylvania mills are buying heavy melting steel, one paying to its special broker \$13 and to others \$12.50; another mill paying \$12 and a third paying \$11.50 for what little is offered it at these low prices. One prominent broker and dealer reports better business than at any time in the past six months. Prices have advanced almost uniformly in all items. Though \$15 is being paid for steel by brokers who are short in the Pittsburgh district, no material is being sent there from here. Cast scrap is strong in spite of the small demand, the strength being based on scarcity.

No. 1 heavy melting steel	\$12.00 to \$12.50
Scrap rail	12.00 to 12.50
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	16.50 to 17.50
Car wheels	17.00 to 17.50
No. 1 railroad wrought	16.00 to 16.50
No. 1 yard wrought	14.50 to 15.00
No. 1 forge fire	10.50 to 11.00
Bundled sheets (for steel works)	9.00 to 9.50
No. 1 busheling	11.50 to 12.00
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	8.00 to 8.50
Mixed borings and turnings (for blast furnace use)	8.00 to 8.50
Machine-shop turnings (for rolling mill and steel works use)	8.00 to 8.50
Heavy axle turning (or equivalent)	9.50 to 10.00
Cast borings (for rolling mills)	10.00 to 10.50
Cast borings (for chemical plants)	10.50 to 11.00
No. 1 cast	17.00 to 18.00
Railroad grate bars	14.00 to 14.50
Stove plate (for steel plant use)	13.50 to 14.00
Railroad malleable	12.00 to 13.00
Wrought iron and soft steel pipes and tubes (new specifications)	13.50 to 14.00
Iron car axles	No market
Steel car axles	No market

Semi-Finished Steel.—There is almost no demand for this material. Many of the users of billets in this district are either shut down or well stocked. A consumer who said he could get \$34 on forging quality finally bought at the regular price of \$35. Rerolling quality is quoted at \$30.

Coke.—Though most of the guaranteed foundry coke in this district is on a \$4.75 Connellsville base, recent sales have been made at \$5 for both spot and contract. Furnace coke is about \$3.50.

Warehouse Business.—Sales are reported as starting out this month at the rate of 10 per cent better than a month ago. Jobbers are keeping their stocks reduced, at the same time being careful to keep complete assortments.

Soft steel bars and small shapes, 2.75c.; iron bars (except bands), 2.50c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 3.05c.; round edge steel planished, 3.80c.; tank steel plates, ¼-in. and heavier, 2.35c.; tank steel plates, 3/16-in., 3.035c.; blue annealed steel sheets, No. 10 gage, 3.25c.; light black sheets, No. 28 gage, 3.75c.; galvanized sheets, No. 28 gage, 4.75c.; square twisted and deformed steel bars, 2.75c.; structural shapes, 2.85c.; diamond pattern plates, ¼-in., 4.60c.; 3/16 in., 4.785c.; ½-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.75c.; squares and hexagons, cold-rolled steel, 4.25c.; steel hoops, No. 13 gage and lighter, 3.65c.; steel bands, No. 12 gage to 2 1/16-in., inclusive, 3.40c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 5c.; Norway iron, 5c.; toe steel, 4.50c.

Cincinnati

CINCINNATI, Oct. 11.

Pig Iron.—Last week was unusually quiet in the pig iron market and few sales of any consequence were reported. An Indiana melter took 400 tons of Southern iron for delivery during the first quarter at \$19, base, Birmingham. Two other sales, each of 100 tons, were made to melters in this territory at a price reported to be \$21, Chicago. It is persistently reported that several Lake furnaces are quoting on a \$20, base, and at least one sale of 100 tons was made at this figure. There are no inquiries of any size, the largest being for approximately 300 tons from the National Cash Register Co. at Dayton. While the past week has been quiet, it is expected that the latter half of the month will show increased activity, as stocks on foundry yards are being steadily cleared up. Quotations from the various districts show no change, Ironton producers holding to \$21, base, and Southern furnaces being firm at \$19.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$23.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	24.00
Ohio silvery, 8 per cent sil.	32.86
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	23.52
Basic, Northern	22.52
Malleable	24.02

Finished Material.—While the individual tonnages booked were not heavy, the aggregate is regarded as very satisfactory. An Ohio fabricator placed an order for 350 tons of structural material and an Indiana fabricator for 250 tons. Other orders ranging from carloads to 150 tons were also booked in the various finished materials. Pipe orders were also fairly numerous and one jobber placed 200 tons with an independent mill. The sheet market is rather quiet, following the comparatively heavy business booked during the previous three weeks. It is reported that some independent companies are considering a further advance of \$5 a ton on sheets and one company is already reported to have advanced its prices to that extent. A fairly good volume of business is reported in tin plate. It is reported that prices are being shaded, in one instance it being said that a price of 4.50c. had been quoted on production plate. The wire business is holding up nicely and an order for 2500 kegs of nails was placed during the week. The Indiana Bridge Co. will fabricate 125 tons for the American Building at Dayton, Ohio, and an independent fabricator is understood to have secured 250 tons for a theater in Indianapolis. The Big Four Railroad is inquiring for several girder spans involving 150 tons. A highway bridge over the Warrior River in Alabama taking 750 tons will be closed on Oct. 19. A high school building for Middletown, Ohio, plans for which are now nearing completion, will likely be up for bids within the next 30 days.

Warehouse Business.—A gradual improvement is still shown in the number and size of orders placed and jobbers report the prospects as most encouraging.

Prices are being firmly maintained, with the exception of wire nails, which have dropped back to the old base of \$3.25 per keg from \$3.40, which was in effect for a few days following the recent advances made by the mills.

Iron and steel bars, 3c. base; hoops and bands, 3.75c. base; shapes, 2.85c. base; plates, 2.85c. base; reinforcing bars, 3.07½c. base; cold rolled rounds, 1½ in. and larger, 4.10c.; under 1½ in. and flats, squares and hexagons, 4.75c.; No. 10 blue annealed sheets, 3.50c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5c.; wire nails, \$3.25 per keg base; No. 9 annealed wire, \$3.00 per 100 lb.

Coke.—Some activity is reported in the coke market, with carload sales predominating. The price situation is firmer, and \$4.50, Connellsville, now appears to be the minimum on foundry coke. Quotations on Wise County and New River fuel are unchanged.

Old Material.—The scrap market has again dropped back into quiet after a short period of fair activity. Dealers report, however, some inquiries from other districts, particularly in the Valley. Prices are inclined to be weaker, but are quotably unchanged in the absence of trading.

We quote dealers' buying prices:

	Per Gross Ton
Bundled sheets	\$4.50 to \$5.50
Iron rails	12.50 to 13.00
Relaying rails, 50 lb. and up	25.50 to 26.50
Rerolling steel rails	11.00 to 12.00
Heavy melting steel	9.50 to 10.00
Steel rails for melting	9.50 to 10.50
Car wheels	12.50 to 13.50

	Per Net Ton
No. 1 railroad wrought	9.00 to 10.00
Cast borings	3.50 to 4.00
Steel turnings	2.50 to 3.00
Railroad cast	12.50 to 13.00
No. 1 machinery	14.00 to 15.00
Burnt scrap	8.00 to 9.00
Iron axles	16.00 to 17.00
Locomotive tires (smooth inside)	10.00 to 10.50
Pipes and flues	4.50 to 5.50

San Francisco

SAN FRANCISCO, Oct. 5.

Pig Iron.—Although the Coast market continues rather quiet, there seems to be a little better feeling gradually developing, some slight improvement in foundry business being reported in some quarters with the somewhat better demand for castings. A perceptible increase in tonnage volume is also noted, principally in small lots so far. Distinctly the largest single sale of pig iron within the last two weeks is that involving approximately 1500 tons of Alsace-Lorraine material, which was taken by a prominent manufacturer of sanitary supplies at prices ranging from about \$29 to \$31, according to the silicon content, delivered San Francisco. Foreign iron continues to occupy the main interest, prices generally being sharply below domestic offerings, some low phosphorus Belgian basic being offered from \$6 to \$9 under.

Finished Iron and Steel.—It appears to be the general impression that a better condition has developed, and is developing, in the steel situation here. While activity is not uniformly more spirited, certain lines are in good demand. This applies particularly to sheets, whose movement seems to have been stimulated by the recent price advances. Galvanized sheets are now being offered at a steady price of 4c., Pittsburgh. Individual inquiries, for the most part, have not been for large quantities, perhaps one of the best prospects being the 300-ton inquiry by the General Petroleum Co. Jobbers report a more active call for sheets from a larger area. The Columbia Steel Co. announces the new base price of reinforcing bars of \$2.85, f.o.b. cars, San Francisco, for this quarter, against the former price of \$2.35. This increase was said to be the result of the lack of demand elicited by the \$2.35 basis, which in itself did not cover costs of production adequately. The Pacific Coast Steel Co. has followed this lead. It is rather too early to expect a change in the volume of business, which in bars has not been great. The jobbers' new price on bars is \$3, warehouse. Some export inquiry has been received lately, perhaps for 1000 tons. Plates are moving well and seem to be steadying. Between 16,000 and 18,000 tin plate boxes have been sold on the basis of \$5.90, delivered Seattle, which means a price below

the market. The State Board of Harbor Commissioners has taken 100 tons of 9-in. girder rails at \$77, delivered, rail and water shipment; 100 tons of standard section T rails, 85 lb., and a large quantity of track special work. Besides this, there are prospects for considerable tonnage on State construction at Sacramento, highway work and schools. Owing to having a sufficient supply of ingots on hand, Judson Mfg. Co. announces closing down one furnace temporarily.

Cast Iron Pipe.—The expected advance of \$4 a ton in the water rate from Mobile to Pacific Coast points, effective Oct. 13, has caused a considerable buying demand on the part of plumbing supply jobbers, who are anticipating their future needs at this time. Business in pipe in California continues steady, although prices have slipped considerably of late. The present market is around \$33 to \$35, shop, for 6-in. pipe, but some lower figures occasionally are heard. Fullerton, Cal., has closed for 2500 tons of the average sizes; San Diego has been asking for 600 tons of from 2 to 8-in. pipe; Madera is in the market for 150 tons of 4 to 8-in., contractors' letting; and Glendale is inquiring for 50 tons of 4-in. pipe.

Coke.—The Southern Pacific Co. appears to be the largest taker of coke, since the general demand remains limited, and confined chiefly to carload lots. Recently this railroad closed for 600 tons of No. 1 foundry at very favorable figures. A large smelting interest is bringing in a quantity of Australian coke.

Old Material.—An increased tonnage of heavy melting steel is reported, a weekly average of probably around 1000 tons being contracted. Large buyers are in the market for material, and it is said holders are firm at \$10 a gross ton, delivered. Freight rates are considered not to warrant a lower figure. Business is more routine in cast iron scrap, with prices nominal at about \$20 or a little better.

Chicago

CHICAGO, Oct. 11.

The mills continue to report a slight increase in bookings, but on the whole the situation has not changed materially during the past week. The Illinois Steel Co. remains on a 39 per cent basis so far as finished steel output is concerned, while the Inland Steel Co. is maintaining a 40 per cent rate. Having blown out one blast furnace in need of repairs and blown in another to take its place, the former company has the same number of active stacks as a week ago. It expects to put in another furnace at Joliet early this week, however, which will give it a total of 11 active stacks out of its 29.

Although further expansion in business is proceeding slowly, the mills are showing less disposition to name low prices than during weeks past. Plates, which have been the weakest commodity in the finished steel market, are firmer. Except on large tonnages of attractive specifications, such as are being sought by car builders, it is extremely doubtful whether less than 1.75c., Chicago, can be done.

The pig iron market is very quiet and additional speculative tonnage has been unloaded at \$21 base local furnace, indicating that buyers are showing resistance to the advancing tendency of prices.

Ferroalloys.—Sales of 700 tons and 50 tons of 14 to 16 per cent ferrosilicon, respectively, have been made locally at less than \$32, delivered. A carload of 50 per cent ferrosilicon has been sold at about \$60, freight allowed. The Scullin Steel Co., St. Louis, is also in the market for a carload. Ferromanganese has been moved here at as low as \$66, delivered.

We quote 78 to 82 per cent ferromanganese, \$66 to \$66.75, delivered; 50 per cent ferrosilicon, \$60, delivered; spiegel-eisen, 18 to 22 per cent, \$36 to \$37, delivered.

Pig Iron.—The only sales of consequence reported were closed at \$21 base, furnace, among them 700 tons of foundry and 400 tons of malleable for local delivery and 100 tons of resale malleable for Milwaukee delivery.

Producers, however, are still holding firmly to \$22, base, furnace, and as the stocks in second hands available at a lower price have practically all been disposed of, the \$21 market is expected to be a thing of the past within a week or two. Foundry operations in this territory are still spotty and the aggregate melt is increasing very slowly. Jackson County silvery is not finding much of a market here, as a Tennessee 8 per cent has been offered at as low as \$32, delivered, and electrolytic material in some cases has been quoted at even lower prices.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil.	
1.50, delivered at Chicago.....	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75.....	\$21.50 to 22.50
Northern coke, foundry, No. 2, sil.	
1.75 to 2.25.....	21.00 to 22.00
Northern high phos.....	22.00
Southern foundry, sil. 1.75 to 2.25....	25.67
Malleable, not over 2.25 sil.....	21.00 to 22.00
Basic	22.00
Low phos., Eastern furnace, sil. 1 to 2	
per cent copper free.....	32.00
Silvery, sil. 8 per cent.....	32.00 to 34.82

Railroad Equipment.—The Chicago, Milwaukee & St. Paul has let 1374 tons for steel center sills to A. M. Castle & Co. The Baltimore & Ohio is inquiring for 1000 50-ton steel hopper cars and 1000 70-ton steel coal cars. The Delaware, Lackawanna & Western has let 500 50-ton all-steel hopper cars each to the American Car & Foundry Co., The Cambria Steel Co., and the Standard Steel Car Co. The Delaware & Hudson is asking for prices on from one to ten high-powered Mikado-type engines. The Union Pacific is reported to be contemplating the purchase of from 35 to 65 locomotives.

Structural Material.—The carpenters and a few other crafts have refused to return to work despite the unanimous vote of the Chicago Building Trades Council, noted in last week's issue. The local building situation is therefore as unsettled as ever, and there seems to be little hope of a real revival in construction work in Chicago this year. In other parts of the West, however, a steady increase in projects is to be noted. Plain material prices are on about the same level as heretofore and fabricating work continues to be taken at extremely low figures. Recent lettings include:

Inland Steel Co., Rail finishing department, 700 tons, to Morava Construction Co.
First Methodist Episcopal Church, Los Angeles, 847 tons, to Baker Iron Works.
Sauk City bridge, Sauk City, Wis., 626 tons, to Wausau Bridge & Iron Co.
Great Northern Railway, 500 tons for bridges, to Wisconsin Bridge & Iron Co.
St. Paul, Minn., addition to purification and filtration plant, 116 tons, to St. Paul Foundry Co.
Niagara Radiator & Boiler Co., plant, Chicago, 375 tons, to Kenwood Bridge Co.
U. S. Gypsum Co., block plant, Ft. Dodge, Iowa, 145 tons, to Lackawanna Bridge Co.

Prospective work includes:

Wisconsin Steel Works, South Chicago, trestle, 325 tons.
Wabash Railroad, bridge, Attica, Ind., 325 tons.

The mill quotation on plain material ranges from 1.75c. to 1.85c., Chicago. Jobbers quote 2.88c. for materials out of warehouse.

Rails and Track Supplies.—The purchase of 12,000 tons of rails noted two weeks ago has been followed by an order from another road for 7000 tons. The Cotton Belt, as noted in the St. Louis market last week, is inquiring for 10,000 tons of rails for 1922 delivery. Light rails are weak, owing to keen competition from rerolling mills, and prices appear to range from 1.70c. to 1.75c., mill. There continues to be a fair amount of spike and bolt business, but prices are unsteady. There is better demand for steel wheels and the local wheel plant is running full, single turn.

Standard Bessemer rails, \$45; open-hearth rails, \$47; light rails rolled from new steel, 1.70c. to 1.75c. f.o.b. makers' mills.

Standard railroad spikes, 2.40c., Pittsburgh; track bolts with square nuts, 3.40c., Pittsburgh; tie plates, steel and iron, 2c., f.o.b. makers' mills.

Plates.—This commodity, which has been the weakest on the list of finished products, is showing signs of firmness. A company which is reputed to be a very close buyer has placed an order for 2100 tons of plates, structural steel and bars at a flat price of 1.75c., Chicago. It appears that this price is now the minimum except on unusually attractive tonnages of desirable specifications, such as are being placed now and then by car builders. Twenty-five hundred tons of steel for New York Central Lines car repairs has been placed with a local mill. This is in addition to the 2250 tons previously placed, as noted a week ago.

The ruling mill quotations range from 1.75c. to 1.85c. Chicago. Jobbers quote 2.88c. for plates out of stock.

Bolts and Nuts.—Just as sheet mills permitted their customers to place orders at the old prices at the time of the recent advance, bolt and nut makers have closed a fair amount of business at the old discounts. How firmly the new quotations will hold when these orders have been taken care of, is still an open question. In this connection, it is perhaps significant that a number of jobbers have taken advantage of the protections offered them and have closed contracts for their needs for two months ahead. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 978.

Jobbers quote structural rivets, 3.68c.; boiler rivets, 3.78c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60 per cent off; larger sizes, 55 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 55 off; larger sizes, 50 and 5 off; hot pressed nuts, square and hexagon tapped, 53 off; blank nuts, 53.25 off; coach or lag screws, gimlet points, square heads, 60 per cent off. Quantity extras are unchanged.

Sheets.—A number of mills have given notice that they will again advance their prices \$5 a ton, effective Oct. 15. The local independent, however, has taken no such action. Ruling prices are about the same as heretofore and buying is not particularly active.

Mill quotations are 3c. for No. 28 black, 2.25c. to 2.50c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight to Chicago of 35c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c. Hoops and bands, 3.48c.

Cast-Iron Pipe.—Ruling prices are about the same as heretofore, but extreme concessions are no longer reported. Recent lettings include: Forest, Ohio, 275 tons to James B. Clow & Sons; St. Paul, 140 tons of specials to Great Lakes Engineering Co., River Rouge, Mich.

Pending business includes: Springfield, Ohio, rejected bids on 1000 tons and will readvertise; Kenmore, Ohio, 500 tons, bids in Oct. 12; Highland Park, Mich., 150 tons, Oct. 10; Bay City, Mich., 200 tons, Oct. 11; Ashland, Ky., 175 tons, Oct. 26.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$45.60 to \$47.10; 6-in. and above, \$42.60 to \$44.10; class A and gas pipe, \$3 extra.

Wire Products.—Bookings of mills have been satisfactory, although not so heavy as in weeks past. Most orders from jobbers call for quick shipment, indicating that the warehouse turnover is rapid. Railroads continue to buy in moderate quantities, an outstanding recent order being one from a Northwestern line calling for 1600 kegs of nails. Prices appear to be firm. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 978.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.48 per 100 lb.; No. 9 and heavier bright basic wire, \$3.63 per 100 lb.; common wire nails, \$3.63 per 100 lb.; cement coated nails, \$3.05 per keg.

Bars.—The demand for mild steel bars is holding its own, but is not increasing perceptibly above the rate attained last week. Buying, although considerably better than it was in August, is still below normal. In this connection it is to be noted that the agricultural implement industry, one of the largest sources of business in this territory, is buying nothing. Purchases of bar iron are spasmodic, and on the whole unsatisfactory, and there is no material change in the demand for hard steel bars.

Mill prices are: Mild steel bars, 1.75c. to 1.85c., Chicago; common bar iron, 1.75c., Chicago; rail carbon, 1.75c., mill or Chicago.

Jobbers quote 2.78c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars is 4.20c. for rounds and 4.50c. for flats squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.53c. base.

Old Material.—Speculation by dealers is pushing quotations upward and while consumers are largely out

of the market and are resisting the attempts to force the market to a higher level, they find it necessary to pay more for material every time they cover for imperative needs. The advanced quotations below, however, represent to a large extent what might be termed a dealers' market. These prices, and in some instances, higher figures, are being paid by them for railroad offerings. Railroad lists include: The Great Northern, 3000 tons; the Northern Pacific, 1200 tons; the Santa Fe, 1000 tons, and the Wabash, 200 tons.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$17.00 to \$17.50
Relaying rails	27.50 to 30.00
Car wheels	16.50 to 17.00
Steel rails, rerolling	14.00 to 14.50
Steel rails, less than 3 ft.	14.00 to 14.50
Heavy melting steel	12.50 to 13.00
Frogs, switches and guards cut apart	12.50 to 13.00
Shoveling steel	12.00 to 12.50
Los phos., heavy melting steel	15.50 to 16.00
Drop forge flashings	8.00 to 8.50
Hydraulic compressed sheet	8.00 to 8.50
Axle turnings	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars	14.50 to 15.00
Steel angle bars	11.50 to 12.00
Iron arch bars and transoms	15.50 to 16.00
Iron car axles	20.00 to 20.50
Steel car axles	14.50 to 15.00
No. 1 busheling	10.00 to 10.50
No. 2 busheling	7.25 to 7.75
Cut forge	11.25 to 11.75
Pipes and flues	8.00 to 8.50
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	11.50 to 12.00
Steel knuckles and couplers	13.50 to 14.00
Coil springs	14.50 to 15.00
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	13.25 to 13.75
Low phos. punchings	12.00 to 12.50
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	3.50 to 4.00
Cast borings	6.00 to 6.50
Stove plate	12.75 to 13.25
Grate bars	11.50 to 12.00
Brake shoes	11.50 to 12.00
Railroad malleable	13.50 to 14.00
Agricultural malleable	13.50 to 14.00
Country mixed	9.00 to 9.50

German Market Less Active

(By Aerial Mail to London)

BERLIN, GERMANY, Sept. 27.—Business during the past week has been active, although it was generally noted that the tone of the market was somewhat less feverish. The reasons for this may partly be found in the fact that a sudden, though only temporary, rise of the mark introduced an element of insecurity and, for a time, served to curb the activity of jobbers. That this was but temporary was plainly evident toward the close of the week, when a renewed drop of the mark automatically stimulated buying activity. Prices have ceased to show extreme advances compared with the rate at which they were increasing during recent weeks, but quotations are largely nominal and hardly warrant consideration as a barometer of the present boom.

Mills have their hands tied with orders up to the spring of 1922, and the prices quoted on new inquiries are frequently ridiculous, intended to discourage further orders. Although some mills are now arranging to increase their output, supplies are still moving slowly and in some districts there is a genuine scarcity of material. This applies particularly to sheets, wire rods and wire products. Numerous complaints are coming from consumers at the dearth of wire rods, of which every available ounce, it is stated, is being shipped abroad, forcing domestic customers to purchase at high prices from jobbers.

In the pig iron market there is a brisk demand for Luxemburg foundry iron No. 3, particularly for export. Quotations range from 1330 to 1450 m. per ton. Because of the depreciation of the mark, the Pig Iron Syndicate has agreed upon a price increase of 150 m. per ton, from Oct. 1. Prices for other grades of pig iron remain unchanged for October. No important changes are reported in the semi-finished material market. Luxemburg works have increased their quotations for sheet bars and basic billets to 2250 m. and for clogged blooms to 2200 m.

Permission to Reduce Ore Rates Granted

(Continued from page 944)

the entire rate structure and the industry has been given an opportunity to benefit from them.

The conferences between railroad executives and the Government officials were held at the suggestion of the latter who share the opinion of industrial interests that high freight rates are one of the chief obstacles in the way of active resumption of business. Cuts were recommended by the Interstate Commerce Commission some time ago for some of the leading basic commodities, including iron and steel, it is said, and the Administration is understood to have been aware that the suggestions were to be made to the carriers and had approved them in advance.

Some of the railroad executives are asking that the Railroad Labor Board be abolished, while others want its activities either restricted or merged with the Interstate Commerce Commission and desire that there be a substantial cut immediately in the wages of the higher paid employees. They also are insisting on quick action regarding the funding bill so as to be able to obtain money to proceed with payment of debts and purchase of requirements for maintenance of way, etc. The Senate Committee on Interstate Commerce is about ready to report the bill with amendments said to be of an advantageous nature to the railroads, which some think, are the result of the favorable attitude of the railroads toward a cut in rates, a subject that will be taken up in Chicago on Oct. 14 between railroad executives. The chief amendment, which remains to be acted upon finally by the committee, would give the railroads the right to sue the Government for claims based on the alleged inefficiency of labor. There is serious doubt that the amendment, if it comes to the floor of the Senate, can pass, not only because of strong opposition in Congress to such legislation, but it is also said that some Administration officials oppose it, although others are said to have no objection to it.

As Viewed at Pittsburgh

PITTSBURGH, Oct. 11.—The temporary restoration of the freight rates on iron ore, in effect prior to Aug. 26, 1920, is 28 per cent, and this applied to rates now in effect amounts to practically the same as the 40 per cent advance made Aug. 26, 1920, applied to rates then in effect. The effect of the reduction, which is to expire Dec. 31, is somewhat questionable. It is generally believed that merchant furnaces have practically all the ore down from the lower lake docks that they are likely to consume over the remainder of the year and consequently the reduction will not be of much assistance to them. The steel companies, however, are carrying stocks of considerable proportions on the lower lake docks and they will benefit by a reduction in the freight charges. Assuming that two tons of ore are used in the making of a ton of pig iron, the saving in freight charges for furnaces in the Valley district is 50 cents, as the new rate is 66 cents per gross ton, as against 91 cents per gross ton, the rate which has been in effect since Aug. 26, 1920. The saving for the Pittsburgh district furnaces runs even higher because the new rate is 92 cents per ton, as compared with \$1.27½, a difference per ton of 35½ cents or 71 cents per ton of pig iron.

The long campaign, having for its object the reduction on rates on ore, coke, limestone, pig iron and steel, finally is bearing fruit. It is believed that the reduction in ore freights will be followed by a cut in tariffs on coke and limestone and possibly on pig iron itself. To date only ore has been mentioned and we present, herewith, a table giving the new rates, those

which became effective Aug. 26, 1920, and those in effect prior to the latter date:

	New Rate	Aug. 26, 1920	Old Rate
Valley	\$0.66	\$0.91	\$0.65
Dover, Ohio	0.71	0.98	0.70
Midland, Ohio	0.80	1.105	0.79
Pittsburgh	0.92	1.275	0.91
*Jackson, Ohio	0.72	1.00	0.71½
†Jackson, Ohio	0.90	1.245	0.89
Hamilton, Ohio	0.995	1.385	0.99
Ironton, Ohio	0.995	1.385	0.99
Johnstown	1.048	1.44	1.03
Lehigh Valley	1.54	2.55	1.54
Sparrows Point	1.60	2.225	1.59

*From Cleveland. †From Toledo.

On dock ore, in addition to the line haul, there is a charge of 22½ cents per gross ton for handling from rail or vessel to the dock pile, of 14 cents from the dock pile to car and a storage charge of 1½ cents per ton per month. These charges, established following the increase in freight rates of Aug. 26, 1920, it is understood, will not be changed as a result of the latest developments in connection with ore freight charges.

Ore Hearing Postponed

WASHINGTON, Oct. 11.—Owing to the illness of one attorney and engagements of others in the case relating to iron ore rates from Lake Superior mines to Lake Erie ports, the hearing which was to have been resumed yesterday in Chicago has been postponed to an indefinite date. Ore shippers who are protesting against both the old and new rates on these shipments say that the application of carriers to make a reduction of 28 per cent in ore rail rates from Lake Erie docks to interior furnaces in official classification territory and from Eastern points to furnaces will not affect their position in the least. They are hopeful, however, that the carriers in their further conferences with iron and steel and ore interests will voluntarily withdraw existing tariffs on shipments from the upper mines and cut these rates instead of merely confining them to shipments from Atlantic and Lake Erie ports. The proposed 28 per cent reduction, it is pointed out, would largely affect dock ore only from Lake Erie ports, inasmuch as direct shipments for this season are nearing an end, and consequently would apply to a comparatively small tonnage and, as now proposed, the shipments at the 28 per cent reduction would last only until the end of the year, though the period might be extended.

Steel Corporation's Orders Increase

Unfilled orders of the United States Steel Corporation, after having declined every month for 13 months, made a gain in September. Unfilled orders Sept. 30 were 4,560,670 tons, an increase of 28,744 tons over the tonnage of Aug. 31.

The unfilled tonnage a year ago was 10,374,804 tons, or 5,814,134 tons more. The table below gives the unfilled tonnage at the close of each month, beginning with January, 1918:

	1921	1920	1919	1918
Jan. 31.....	7,573,164	9,285,441	6,684,268	9,477,853
Feb. 28.....	6,933,867	9,502,081	6,010,787	9,288,443
Mar. 31.....	6,284,765	9,892,075	5,430,572	9,056,404
Apr. 30.....	5,845,224	10,359,747	4,800,865	8,741,882
May 31.....	5,482,487	10,940,465	4,282,310	8,387,625
June 30.....	5,117,868	10,978,817	4,892,855	8,918,866
July 31.....	4,830,324	11,118,468	5,578,661	8,883,891
Aug. 31.....	4,531,926	10,805,038	6,109,103	8,759,042
Sept. 30.....	4,560,670	10,374,804	6,284,638	8,297,905
Oct. 31.....		9,836,852	6,472,668	8,353,293
Nov. 30.....		9,021,481	7,128,330	8,124,663
Dec. 31.....		8,148,122	8,265,366	7,379,172

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons. The lowest was on Dec. 31, 1910, at 2,605,747 tons.

A new plant housed in one building 100 x 350 ft. is being completed for the Heltzel Steel Form & Iron Co., Warren, Ohio, to replace structures destroyed by a fire June 2. The new building is of brick and steel construction and of the monitor type.

EXPORT MEETING

American Manufacturers' Association Opposes American Valuation Plan in Tariff

A slight note of pessimism pervaded the discussions of European market conditions at the twelfth annual convention of the American Manufacturers' Export Association, Oct. 5 and 6, at the Waldorf-Astoria Hotel, New York. The keynote of the convention was "How to Retain and Increase Export Trade." Both the tariff as a whole and the American valuation plan as a part of the tariff were criticized. On the question of the proposed tariff a resolution calling upon Congress to consider the effect of an undue increase in the tariff with Cuba was passed. Pointing out that Cuba is tied to the United States both politically and economically, that our trade there in 1920 amounted to more than the total of our trade with all the Spanish-speaking South American countries, and that growing German competition in this market necessitates more than ever before the preferential agreements between the two countries, the resolution concluded:

Therefore, Be it hereby resolved by the members of the American Manufacturers' Export Association to recommend to Congress a most careful consideration of the effect that an undue increase in the tariff would have upon the trade between the two countries, the large American investments in Cuba, and the prosperity of the island, and further recommend to the Secretary of State the advantages that would follow favorable consideration of the petition of the Cuban Commercial Mission now in the United States for a rearrangement of the existing treaty between the United States and Cuba, by which the present differential of 20 per cent would be substantially increased.

George Weston, general manager for South America of the American Express Co., spoke on "Some Present Day Conditions in Argentina, Brazil and Uruguay." "The Problems of Exchange" were discussed with Allen Walker, Guaranty Trust Co., in charge, and "Foreign Credits and Investments" were considered following an address by William S. Kies, chairman of the board First Federal Foreign Banking Association. "Our Relation to the Present European Situation" from an economic, industrial and banking point of view was held under a general discussion following short addresses by W. F. H. Koelsch, president New Netherland Bank of New York; John S. Lawrence, Lawrence & Co., Boston; and Benjamin M. Anderson, Jr., Chase National Bank, New York.

Opposed to American Valuation Plan

A rather heated discussion arose at the final afternoon session over the American valuation plan, which was the subject of an address by Thomas J. Doherty of the National Council of American Importers and Traders, Mr. Doherty opposing the introduction of this system of valuation in the new tariff. He pointed out that although a somewhat similar system was in force on June 30, 1842, it lasted only about two months, a new law going into effect on Aug. 30 of the same year. Consequently this is not only an untried plan but it means "scrapping" practically all the knowledge and experience gained under the method that has prevailed for more than 100 years. "The language of this section of the tariff was so ambiguous," said Mr. Doherty, "and the terms as used were so susceptible of different and conflicting meanings, and the whole plan was so utterly unworkable, that the Senate finance committee, after hearing some of the critics, threw it out of the bill and tentatively adopted a substitute." Although this substitute has eliminated some of the absurdities and ambiguities of the House bill, it nevertheless makes the same revolutionary change in the entire customs system and is still impracticable, according to Mr. Doherty.

Judge John F. Zoller, General Electric Co., spoke in refutation of Mr. Doherty's assertions. Immediately

upon conclusion of Judge Zoller's address it was moved by David Schwab, Krower & Tynberg Co., that the convention go on record as opposed to the American valuation plan, and following a short but heated discussion, chiefly by members opposing the introduction of this system, the resolution of opposition was adopted by a large majority, stating that "in view of the confusion which a new system like the American valuation plan would add to an already greatly unsettled world condition, this meeting goes on record as being opposed to the American valuation and excessive import duty."

The retiring president of the association, William C. Redfield, reviewed the past year's activities of the organization and introduced the theme of "How to Retain and Increase Export Trade." He concluded: "Whether our financial forces can so far recover vision as to take the leadership to which they are called and which the industrial world would welcome is a question whose answer lies in the lap of the gods. I cannot believe that leaders of finance will longer delay. But if they do, with what gladness would be heard in our industrial life the news that 25 or 50 great industries had undertaken to create, manage and direct a great financing company whose high purpose it should be to promote and support American industry in its outreach into the foreign field."

New Officers

Officers for the coming year were elected as follows: President, Myron W. Robinson, president Crex Carpet Co., New York.

Vice-presidents, H. S. Demarest, Greene, Tweed & Co., New York; J. S. Lawrence, Lawrence & Co., Boston; E. M. Heinz, Fort Dearborn National Bank, Chicago; Frank H. Taylor, S. S. White Dental Mfg. Co., Philadelphia; Julius Goslin, Jubert & Goslin Machine & Foundry Co., Birmingham; V. H. Pinckney, California Packing Co., San Francisco.

Treasurer—Philip B. Kennedy, vice-president First Federal Foreign Banking Association, New York.

Directors for a period of three years were: W. S. Gavan, E. I. du Pont de Nemours Export Co., New York; J. Walter Drake, Hupp Motor Car Corporation, Detroit; M. A. Oudin, International General Electric Co., Schenectady, N. Y.; F. K. Rhines, General Fireproofing Co., New York; E. W. Droosten, Robbins & Myers Co., New York.

Some Improvement in Foundry Work

Rogers, Brown & Co., Cincinnati, in their latest pig iron market review refer to some betterment in foundry operations: "For the first time in months, foundries quite generally throughout the country have noticed an encouraging increase in new business. Those shops which are specializing in the manufacture of some particular product, such as washing machines, printing presses or the like, have felt the improvement more than those doing a jobbing business. This is natural. A large part of the work normally secured by the jobbing foundries is overflow and the manufacturing plants see to it that their own floors are full before placing any business outside. Foundrymen report that the prices received on the new orders are cost or slightly better, but they are glad of an opportunity to operate and break even. This exchange of goods may be expected to start the sluggish circulation of business and lead to better things."

Unemployed in Pennsylvania

PITTSBURGH, Oct. 10.—There are 298,625 men out of work in Pennsylvania, Clifford B. Connelley, State Commissioner of Labor and Industry, told a meeting of the Co-operative Welfare Federation at the Pittsburgh Chamber of Commerce last Friday. Of that number 60,800 are in Pittsburgh. Mr. Connelley spoke on the unemployment situation and said that prominent men have confidence in an early resumption of business and a decrease in the army of unemployed. He also explained the system of his department in gathering unemployment statistics.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic..\$0.35	Kansas City\$0.815
Philadelphia, export... 0.265	Kansas City (pipe)... 0.77
Baltimore, domestic... 0.335	St. Paul 0.665
Baltimore, export... 0.255	Omaha 0.815
New York, domestic... 0.38	Omaha (pipe) 0.77
New York, export... 0.285	Denver 1.35
Boston, domestic... 0.415	Denver (wire products) 1.415
Boston, export 0.285	Pacific Coast 1.665
Buffalo 0.295	Pacific Coast, ship plates 1.335
Cleveland 0.24	Birmingham 0.765
Detroit 0.325	Jacksonville, all rail.. 0.555
Cincinnati 0.325	Jacksonville, rail and water 0.46
Indianapolis 0.345	New Orleans 0.515
Chicago 0.38	
St. Louis 0.475	

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, 81c.; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ½ in. thick and over, and zeos, structural sizes, 1.60c. to 1.75c.

Steeled plates, ¼ in. and heavier, tank quality, 1.60c. to 1.75c.

Wire Products

Wire nails, \$2.90 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.60 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.60; galvanized wire, \$3.10; galvanized barbed wire, \$3.55; galvanized fence staples, \$3.55; painted barbed wire, \$3.05; polished fence staples, \$3.05; cement-coated nails, per count keg, \$2.45; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70½ per cent off list for carload lots, 67 to 69½ per cent for 1000-lb. lots, and 66 to 68½ per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....\$2.40 case
Large boiler rivets.....\$2.50 case
Small rivets70, 10 and 5 to 70, 10 and 7½ per cent off list
Machine bolts, small, rolled threads, 70, 10 and 5 per cent off list

Machine bolts, small, cut threads, 70 and 5 per cent off list
Machine bolts, larger and longer, .65, 10 and 5 per cent off list
Carriage bolts, ¾ in. x 6 in.:
Smaller and shorter rolled threads,

65, 10 and 10 per cent off list
Cut threads65 and 10 per cent off list
Longer and larger sizes65 and 10 per cent off list
Lag bolts70 and 10 to 70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads, .60 and 10 per cent off list
Other style heads20 per cent extra

Machine bolts, c.p.c. and t. nuts, ¾ in. x 4 in.:
Smaller and shorter.....65 and 5 per cent off list
Larger and longer sizes.....65 per cent off list
Hot pressed sq. or hex. blank nuts.....\$5.50 off list
Hot pressed nuts, tapped.....\$5.00 off list
C.p.c. and t. sq. or hex. blank nuts.....\$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped.....\$5.00 off list
Semi-finished hex. nuts:

¼ in. to 9/16 in. inclusive.....80, 10 and 10 per cent off list
Small sizes S. A. E.80, 10, 10 and 10 per cent off list
¾ in. to 1 in. inclusive, U. S. S. and S. A. E.,
70, 10, 10 and 10 per cent off list
Stove bolts in packages.....80, 10 and 5 per cent off list
Stove bolts in bulk.....80, 10 and 7½ per cent off list
Tire bolts65, 10 and 10 per cent off list
Track bolts, carloads.....3.25c. to 3.50c. base
Track bolts, less than carloads.....4.25c. to 4.50c.

Square and Hex. Head Cap Screws

¼ in. and under.....75 and 10 to 80 and 10 per cent off list
9/16 in. to ¾ in.....75 and 10 to 80 and 10 per cent off list

Set Screws

¼ in. and under.....80, 10 and 5 to 85 per cent off list
9/16 in. to ¾ in.....80, 10 and 5 to 85 per cent off list

Rivets

Rivets, 1c. per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs, 25c. extra to buyers not under contract; small and miscellaneous lots less than two tons, 25c. extra; less than 100 lb. of a size or broken kegs, 50c. extra.

All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$41; chain rods, \$41; screw stock rods, \$46; rivet and bolt rods and other rods of that character, \$41; high carbon rods, \$49 to \$53, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes 9/16-in. and larger, \$2.35 to \$2.50 base per 100 lb. in lots of 200 kegs of 200 lb. each or more, spikes, ½-in., ¾-in. and 7/16-in., \$2.60 to \$2.75 base; 5 16-in. \$2.60 to \$2.75 base. Boat and barge spikes, \$2.60 to \$2.75 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, \$3.25 to \$3.50 base per 100 lb. Tie plates, \$2 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$11.30 per package; 8-lb. coating, 1 C., \$11.60; 15-lb. coating, 1 C., \$14.30; 20-lb. coating, 1 C., \$15.55; 25-lb. coating, 1 C., \$16.80; 30-lb. coating, 1 C., \$17.80; 35-lb. coating, 1 C., \$18.80; 40-lb. coating, 1 C., \$19.80 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. to 1.65c. from mill. Refined bar iron, 2.15c. to 2.25c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/4	54½	28	1/4 to 3/8	31½	22½
1/4 to 3/8	57½	31	3/8	36½	18½
1/2	62½	48	3/8 to 1	42½	27½
3/4	66½	54	1 to 1½	44½	29½
1 to 3	68½	56			

Lap Weld

2	61½	49	2	39½	25½
2½ to 6	65½	53	2½ to 6	42½	29½
7 to 8	62½	49	7 to 12	40½	27½
9 to 12	61½	48			

Butt Weld, extra strong, plain ends

1/4	50½	33	1/4 to 3/8	41½	37½
1/4 to 3/8	53½	35	3/8	35½	23½
1/2	59½	48	3/8 to 1	42½	28½
3/4	64½	53	1 to 1½	44½	30½
1 to 1½	66½	55			
2 to 3	68½	56			

Lap Weld, extra strong, plain ends

2	59½	48	2	40½	27½
2½ to 4	63½	52	2½ to 4	43½	31½
4½ to 6	62½	51	4½ to 6	42½	30½
7 to 8	58½	45	7 to 8	35½	23½
9 to 12	52½	39	9 to 12	30½	18½

To the large jobbing trade the above discounts are increased by one point, with extra discounts of 5 and 2½ per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1½ in.	26½	1½ in.	5
2 to 2½ in.	41	1½ to 1¾ in.	15
2½ to 3 in.	52	2 to 2½ in.	25
3½ to 13 in.	57	2½ to 3 in.	30
		3½ to 4½ in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Box Annealed, One Pass Cold Rolled	
Cents per Lb.		Cents per Lb.	
Nos. 8 and heavier.....2.45		Nos. 13 and 14.....2.60	
Nos. 9 and 10 (base).....2.50		Nos. 15 and 16.....2.70	
Nos. 11 and 12.....2.55			
Cents per Lb.		Cents per Lb.	
Nos. 17 to 21.....2.80		No. 28 (base).....3.00	
Nos. 22 to 24.....2.85		No. 29.....3.10	
Nos. 25 and 26.....2.90		No. 30.....3.20	
No. 27.....2.95			

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11.....3.00		Nos. 25 and 26.....3.70	
Nos. 12 to 14.....3.10		No. 27.....3.85	
Nos. 15 and 16.....3.25		No. 28 (base).....4.00	
Nos. 17 to 21.....3.40		No. 29.....4.25	
Nos. 22 to 24.....3.55		No. 30.....4.50	

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16.....2.80		No. 28 (base).....3.00	
Nos. 17 to 21.....2.85		No. 29.....3.05	
Nos. 22 to 24.....2.90		No. 30.....3.10	
Nos. 25 to 27.....2.95		Nos. 30½ and 31.....3.10	

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin New York	Lead		Zinc	
	Lake	Electro- lytic		New York	St. Louis	New York	St. Louis
Oct. 1	12.75	12.50	27.00	4.70	4.50	5.05	4.55
2	12.82½	12.62½	27.00	4.70	4.50	5.05	4.55
3	13.00	12.75	27.00	4.70	4.50	5.07½	4.57½
4	13.00	12.75	27.00	4.70	4.50	5.10	4.60
10	13.12½	12.82½	27.00	4.70	4.50	5.10	4.60

New York

NEW YORK, Oct. 10.

The strength noted in copper, lead and zinc in recent weeks has been maintained during the past week, with additional firmness in copper and zinc. There has been little or no change in lead and tin prices, but prices of copper and zinc are higher. Business is fairly active, particularly in copper.

Copper.—A steady, firm tone has prevailed during the week in copper, with a slight tendency toward higher prices. Some producers are now declining to accept any business in electrolytic at less than 13.25c., delivered, though the regular market is quoted a shade under this price, about 13.12½c., delivered. A good demand continues, there being inquiries for several million pounds, in addition to about 10,000,000 lb. for one brass interest mentioned last week. The presence in New York this week of leading brass manufacturers in attendance at a trade meeting was expected to bring negotiations for copper from some who hitherto have not made inquiry. Export trade has broadened. There have been fairly large exports to Germany and the price now quoted is 13.25c., delivered Hamburg. The same price is quoted to England, but the English have not been disposed to buy at this price. The recovery in sterling exchange, however, is expected to make it possible for British buyers to accept the American price. The market is generally strong with producers selling only a limited quantity at each fractional rise in price.

Tin.—Moderate sales of tin were made during the past week. A little was done each day, but at no time was there any marked activity. The bulk of the business done was for November and December shipment from the Far East, and there was a little better demand for spot, but interest in the intermediate position was negligible. Spot supplies are concentrated in few hands, hence the market presents a somewhat firmer tone, which is in contrast to the weakness prevailing in London, where prices are slightly below those quoted on Tuesday of last week. To-day's (Monday) London prices were £155 15s. for spot standard, £157 15s. for standard future and £156 5s. for spot Straits. Spot business has been done during the week at 27c., but for the later shipments prices were ¼ to ½c. higher.

Lead.—A moderate degree of activity is noted in the lead market, but the demand is of small proportions and is not insistent. Prices are unchanged. The American Smelting & Refining Co. continues to quote 4.70c. for both New York and St. Louis, but other producers are selling at St. Louis at 4.50c. The outside market in New York is fully \$1 a ton above the American Smelting & Refining Co.'s price.

Zinc.—Further stiffening in zinc prices has occurred within the past few days, 4.60c., St. Louis, now being generally quoted, with an occasional quotation up to 4.65c., St. Louis. A fairly large order for zinc is said to have been placed Saturday at 4.60c. Sales of zinc are in excess of production and this is causing producers to adopt a more conservative selling policy as most of them do not want to withdraw from their surplus stocks at present prices.

Antimony.—We quote antimony at 5c., New York. The market is without feature.

Aluminum.—There is no change in aluminum prices, the leading American producer continuing to quote

24.50c. per lb., f.o.b. plant, for 98-99 per cent virgin metal, while importers quote 18c. to 19c., New York, on a similar grade of foreign aluminum.

Old Metals.—Prices are higher and business is fairly active. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	12.25
Copper, heavy and wire	11.25
Copper, light and bottoms	9.50
Heavy machine composition	9.75
Brass, heavy	7.00
Brass, light	5.50
No. 1 red brass or composition turnings	7.75
No. 1 yellow rod brass turnings	5.50
Lead, heavy	4.25
Zinc	3.25
Lead, tea	3.00

Chicago

OCT. 11.—Copper has advanced, but no great activity is reported. Numerous inquiries for copper have appeared in the market, but buyers are reluctant to pay the prices at which producers are holding the material. Zinc has declined slightly. The market as a whole is quiet. Old material prices have advanced rather generally. We quote in carload lots: Lake copper, 13.25c. to 13.50c.; tin, 28.50c.; lead, 4.65c.; spelter, 4.60c.; antimony, 7c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 8.50c.; copper bottoms, 7c.; red brass, 7c.; yellow brass, 5c.; lead pipe, 3c.; zinc, 2.25c.; pewter, No. 1, 17c.; tin foil, 18c.; block tin, 20c.; all buying prices for less than carload lots.

St. Louis

ST. LOUIS, Oct. 11.—The lead market is steady and unchanged at 4.50c. carlots, while slab zinc is quiet and steady at 4.55c. to 4.60c. We quote Lake copper at 12.74½c. to 13.73½c., carlots; tin, 27.61c., and antimony, 5.73½c. to 5.73¾c. In old metals, we quote: light brass, 3.50c.; heavy red brass, 7c.; light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; lead, 3c.; pewter, 15c.; tinfoil, 16c.; tea lead, 2c.; aluminum, 9c.

Mild Improvement in Refractories

PITTSBURGH, Oct. 10.—Although business in fire clay brick and other refractories still leaves much to be desired, there has been some improvement in the demand as compared with last month. Orders rarely exceed 100,000 brick, but the fact that numerous small orders are coming out from widely scattered sources is taken to mean that the steel manufacturers have pretty well exhausted their reserves and feel the necessity of replenishing them. Ordinarily, there is a lapse of about six months between improvement in the steel business and a corresponding gain in refractories sales. In view of the fact that only here and there among the steel companies of the country has there been a complete suspension of operations for any considerable length of time, manufacturers of refractories believe that steel plant stocks of brick are pretty well used up and consequently expect a better business much sooner after definite betterment in the steel business than usually is the case. There is fairly good adherence to quotations on the part of makers and the claim still is set forth that, pending the liquidation of freight and fuel costs, no further reduction is possible. Some weakness is apparent, however, in Pennsylvania silica brick, due to one or two makers cutting prices.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$34.00 to \$37.00	\$28.00 to \$34.00
Ohio	34.00 to 38.00	28.00 to 33.00
Kentucky	33.00 to 37.00	30.00 to 35.00
Illinois	35.00 to 40.00	30.00 to 35.00
Missouri	37.00 to 42.00	28.00 to 33.00
Silica Brick:		
Pennsylvania		33.00 to 35.00
Chicago		38.00 to 40.00
Birmingham		46.00
Magnesite Brick:		
Standard size, per net ton		65.00
Chrome Brick:		
Standard size, per net ton		52.00

PERSONAL

E. E. Barto has been appointed production manager of the Warren Iron & Steel Co., Warren, Ohio. Mr. Barto, for the past three years, has been connected with the Indiana Rolling Mill Co., Newcastle, Ind., in the capacity of production manager. Fifteen years previous to that, Mr. Barto was connected with the Jessop Steel Co., Washington, Pa., as rolling mill superintendent. He has had experience in rolling high carbon and alloy open-hearth, electric furnace, and crucible steels.

Abner U. Howard has been appointed sales manager for N. & G. Taylor Co., Inc., general offices 300 Chestnut Street, Philadelphia. Mr. Howard was for many years connected with the National Conduit & Cable Co., New York, and recently with the Stamford Rolling Mill Co., Stamford, Conn., as sales manager.

Frank H. Landon, 140 South Dearborn Street, Chicago, has been appointed district representative for the Falcon Steel Co., Niles, Ohio, in the Chicago territory. Mr. Landon will represent the company in the sale of black, blue annealed and galvanized steel sheets.

J. M. Ross, auditor of Wheeling Steel Corporation since its formation, recently was elected secretary of the corporation, succeeding G. W. Hocking, who resigned early in August. Prior to joining the Wheeling Steel Corporation, Mr. Ross was identified with Price, Waterhouse & Co. and gained considerable familiarity with the steel business through auditing the accounts of steel companies. He will act for the present as both secretary and auditor.

Henry Chalmers, of Brooklyn and Albany, N. Y., has been appointed chief of the Division of Foreign Tariffs of the Bureau of Foreign and Domestic Commerce, succeeding Louis Domeratzky, who has been advanced to the position of assistant director of the Bureau. Mr. Chalmers was formerly connected with a textile exporting house in New York and since 1919 has been on the staff of the United States Tariff Commission as special expert, investigating industrial and commercial conditions here and abroad. He is a graduate of Cornell University (M. A. 1914), and the author of a number of reports bearing on foreign trade, published by the Tariff Commission.

Charles M. Sullivan, since Jan. 1, 1919, Pittsburgh district manager of sales of the Milwaukee Electric Crane & Mfg. Co., Milwaukee, has resigned, effective Oct. 15, to become affiliated with Manning, Maxwell & Moore, Inc. Mr. Sullivan will be in the Pittsburgh office in the Shaw crane sales department. Byron B. Evans succeeds Mr. Sullivan in charge of the Pittsburgh office of the Milwaukee Electric Crane & Mfg. Co. He was formerly associated with the Pittsburgh Perforating Co., Pittsburgh.

Hector W. Fielden, who resigned recently as assistant treasurer Penn Seaboard Steel Corporation and comptroller Tacony Steel Co., has resumed the practice of accountancy. Fielden & Co. with offices in the Flanders Building, Philadelphia, will specialize in the accounting of iron, steel and allied industries, a field in which Mr. Fielden and his associates have a wide knowledge and experience.

Charles D. Conklin, Jr., formerly New York and Philadelphia district engineer for the Austin Co., has become associated with the W. P. Cameron Engineering Co., Philadelphia, as chief engineer in charge of construction.

Dr. Ernest Fox Nichols, inaugurated last spring as president of Massachusetts Institute of Technology, was prevented by illness from assuming his duties at the opening of the academic year. He is expected to return about Jan. 1. His ill health was brought about by overwork previous to his election to the presidency. Meanwhile the institute will be governed by an administrative committee.

Franklin D. Warren, resident engineer American Mutual Liability Insurance Co., spoke on safety appli-

ances before the management section of the Providence Engineering Society, Providence, R. I., on Oct. 4. He outlined the progress of the safety movement from its employment in large steel mills and similar plants, where the more serious accidents are apt to occur, to the present almost universal consideration of safety welfare in industrial establishments. The talk was illustrated by slides and moving pictures.

Charles M. Schwab, chairman Bethlehem Steel Corporation, is scheduled to address the American Mining Congress, which meets Oct. 17 to 22, at Chicago, on "Co-operative Effort in Industry."

John L. Taylor has resigned his position with L. F. Seyfert Sons, Inc., and has established himself as a dealer in machinery at 6315 Torresdale Avenue, Philadelphia.

F. Paul Anderson, dean of the college of engineering, University of Kentucky, has been appointed director of the research laboratory of the committee on research of the American Society of Heating and Ventilating Engineers, to succeed the late John R. Allen. L. A. Scipio, who has been acting director since Dr. Allen's death in October, 1920, has been recalled to his position as dean of Robert College, Constantinople. Following his graduation from Purdue University in 1890, Dean Anderson spent some months as designer of special machinery with the Studebaker Co. at South Bend, after which he devoted a year to experimental engineering at Purdue University. For 30 years he has served respectively as professor of mechanical engineering, director of experimental laboratories, and dean of the college of engineering of the University of Kentucky, formerly the State College of Kentucky. He was for 25 years engineer of tests for the Southern Railway Company, and at the same time carried on a consulting engineering and architectural business.

William Hill, president Collins Co., Hartford, Conn., agricultural implements, has resigned and has been succeeded by Charles L. Taylor, Taylor & Fenn Co., castings. Mr. Taylor is already a director and member of the executive committee of the Collins Co. He spent his early manhood in machine shops and later acquired interests in the Phoenix Iron Works, which later became the Taylor & Fenn Co.

K. E. Wagner has been appointed general sales manager with offices at 534 Bulkley Building, Cleveland, of the Massillon Reinforcing Bar Co., main offices and works at Massillon, Ohio.

H. O. Davidson, for the past eight years affiliated with the Hydraulic Steelcraft Co., latterly in the capacity of general manager, has severed that connection to become general manager in Baltimore of the C. D. Pruden plant of the Blaw-Knox Co., Pittsburgh.

T. A. Jones, for many years secretary and treasurer of the W. A. Jones Foundry & Machine Co., Chicago, has been elected president to succeed William A. Jones, who died recently. W. G. Jones, manager, continues in that position and has also been elected vice-president and treasurer. J. A. Sizer has been elected secretary, and G. W. Page assistant secretary. Robert B. Moir has been appointed manager of the New York branch of the company. He will make his headquarters at the present sales office and transmission warehouse at 20 Murray Street, New York.

W. F. Abel has been appointed assistant general manager of sales of the Electric Alloy Steel Co., Youngstown, Ohio. For thirteen years he was in charge of sales for the Halcomb Steel Co.

Herbert R. Hyman, for seven years advertising manager of the Cole Motor Car Co., Indianapolis, has become associated with the Charles H. Fuller Co., advertising agency of Chicago.

J. M. Willis, formerly vice-president and general manager of the Baltimore Dry Docks & Shipbuilding Co., Baltimore, which plant was recently acquired by the Bethlehem Shipbuilding Corporation, has been appointed general manager of the plant, which is known as the Baltimore Dry Docks plant of the Bethlehem Shipbuilding Corporation.

W. S. Pilling, of Pilling & Co., Philadelphia, returned this week from a European trip.

OBITUARY

DEWITT C. CLAPP, one of the founders of the Black Diamond Steel Works, Pittsburgh, the plant of which is now one of the works of the Crucible Steel Co. of America, and later an official of the steel making firm of Park Bros. & Co., died at his home in Pittsburgh, Oct. 5. He was born in Martinsburg, N. Y., July 13, 1827. He went to Pittsburgh in 1853. He became identified with the steel industry in 1882 when he helped organize the Black Diamond Steel Works. He retired from active business in 1900, following the absorption of Park Bros. & Co. by the Crucible Steel Co.

CHARLES F. BRAGG, former mayor of Bangor Me., and president of the firm of N. H. Bragg & Sons, heavy hardware, iron and steel, that city, died Sept. 12, in his seventy-second year. His father founded the business 50 years ago and upon his death Charles F. Bragg succeeded him.

HENRY B. BARNHART, 59, superintendent of the open-hearth department of the Brier Hill Steel Co., Youngstown, Ohio, died on the evening of Oct. 3 from paralysis. Mr. Barnhart had been identified with the Brier Hill company for the past five years, after resigning as department superintendent of the Illinois Steel Co., Chicago, where he had served for eight years.

RANDOLPH S. WARNER, Columbus, Ohio, died at Geneva, Ohio, Oct. 4, aged 68 years. Mr. Warner, who went to Columbus in 1877, was one of the founders of the Warner Steel Co. at Middletown, Ohio. In 1880 the company moved to Columbus and became the old Carnegie Steel plant, which was later sold to the Federal Steel Company. Mr. Warner was also a former president of the Republic Iron & Steel Co., when the head offices were located in Chicago. Upon the removal of the company's offices to Youngstown, Mr. Warner retired from active participation in its affairs. He returned to Columbus in 1911, and since then his business activities have been mostly in connection with the Hayden-Clinton Bank, the Buckeye Steel Castings Co., and the Hocking Valley Railroad.

HARRY G. HAMILTON, 56, identified with a number of important industrial enterprises at Youngstown, Ohio, died Oct. 8 following an illness of many months. In 1892 Mr. Hamilton became superintendent of one of the mills of the Ontario Rolling Mill Co., now known as the Canada Steel Co., Ltd. The following year he obtained an interest in a rolling mill at Burlington, Ia., and later moved the business to Tacoma, Wash. He subsequently projected a number of water development enterprises in the Mahoning and Shenango Valleys.

L. E. PURNELL, manager of the Cleveland office of the Ajax Metal Co., Philadelphia, died suddenly Oct. 6. His death was due to heart disease.

ALEXANDRE GOUVY, who made an extended tour of the United States in 1919 and who died suddenly several months ago in Germany, is the subject of an appreciation by L. Guillet, published in the transactions of the Société des Ingénieurs Civils de France. He was born at Hombourg-Haut (Moselle), Nov. 14, 1856, was graduated in 1879 from Ecole Centrale and became identified with the Austro-Hungarian railroads, where he remained nine years, specializing in metallurgical work at the Resicza works in Hungary and then taking charge of the maintenance and construction of the Hutabankowa works, his jurisdiction covering blast furnaces, open-hearth furnaces and rolling mills. In 1893 he returned to France to take charge of the Forges d'Alais at Tamaris, but from 1896 he spent a number of years in Russia to establish in the Urals a plant for making pig iron with wood as fuel. He built two plants, including all the equipment with facilities which he had on the spot, working under the difficulties of unskilled labor and in a country 150 miles from the Trans-Siberian Railroad. After other notable achievements in Russia in respect to the reorganization and building of new plants, he established himself at Düsseldorf, in Germany, in 1901, with a number of missions, which included consultation for a large number

of metallurgical firms. The transactions of the Society of Civil Engineers of France contain many contributions from Mr. Gouvy, chiefly on metallurgical matters, and he performed several services for France in the war, including technical artillery missions in Russia in 1915 and metallurgical services to the Minister of Armament in 1917 and 1918.

Trade Paper Quotations in the Ferromanganese Dumping Case

The reliability or unreliability of trade paper quotations is proving to be one of the chief issues in the so-called ferromanganese dumping case before the Federal Trade Commission, final arguments on which are to be held Oct. 21. This is made evident by the brief prepared by Davies & Jones, attorneys for Crocker Bros., New York, who, with Frank Samuel and C. W. Leavitt, constitute the respondents. The Crocker brief, seeking to disprove the claim of Special Attorney I. E. Lambert that the respondents, as importers, representing English makers of ferromanganese, dumped that product in the United States market in 1919, quotes evidence and maintains that "trade paper quotations are not accurate evidence of market price and that on a falling market actual sales are always below the trade paper quotations or nominal price."

As denoted at the hearings, Attorney Lambert upheld the trade paper quotations as being reliable, and it is believed that he will give strong supporting evidence to this contention in his brief and show that such quotations are not only accepted for their accuracy by the higher courts in the United States, but are preferred to quotations coming from either seller or buyer because of the impartiality of trade paper quotations.

The Crocker brief, however, aside from this issue, states that the record shows conclusively that Crocker Bros. made no sales for their English principals in 1919 until after the American makers had reduced the price on ferromanganese "to very near the low level for 1919," which is taken to be the answer to the contention of Attorney Lambert in his exceptions to the findings of Examiner Averill, the attorney for the commission maintaining that the importers were the first to reduce prices in the American market and that they sold at figures "substantially less" than the home market.

Increased Production of Coal and Coke

UNIONTOWN, PA., Oct. 10.—Increase in coal and coke production in the Connellsville region is consistent. Output last week, it is estimated, will show an increase of approximately 10 per cent in both coal and coke over the production of a week ago. There is a decidedly firmer tone in the price of furnace coke, \$3.50, ovens, now being the minimum quotation. Considerable interest was shown this week in inquiries for 15,000 tons a month from the Lackawanna Steel Co. So far as is known here today, no contract has yet been closed.

Independent operations in the region in both coal and coke are increasing. The Frick Coke Co. is increasing its coal production and there are indications that ovens will be put in blast before very long.

Coal prices also are firmer, Pittsburgh quotations now being in excess of \$2. There is every indication now of sharp price advances during the ensuing month in both coal and coke.

Freight shipments on the Pennsylvania railroad alone out of the Connellsville district have shown gains of 150 cars a day over shipments of July and August. About 90 per cent of this traffic is coal and coke.

Light Duty Francke Couplings

A new line of light duty Francke couplings for small motor work is announced by Smith & Serrell, Central Avenue at Halsey Street, Newark, N. J. They range from a size of 5/8 in. bore upward and a power transmitting capacity of 2/3 hp. per 100 r.p.m. They are identical with the heavier duty Francke flexible couplings in comprising two flanges connected by flexible laminated steel pins distributed around the periphery of the flange.

Machinery Markets and News of the Works

LARGE RAILROAD LIST

Delaware, Lackawanna & Western Inquires for About 40 Tools

Other Lists Expected Within Next 60 Days—Prospects Are More Encouraging

The issuance of an inquiry for about 40 machine tools, which will cost about \$200,000, by the Delaware, Lackawanna & Western Railroad is one of several developments of the first 10 days of October that give more encouragement to the machine-tool trade than it has had in many months. The Lackawanna inquiry is said to cover the road's 1922 requirements. A survey of the railroad field which some of the Cincinnati machine-tool builders have made discloses that several other large railroad lists will be issued within the next 60 days.

Railroad buying is in relatively small volume, but a greater number of roads are coming into the market and, if the improvement continues, a fair volume of railroad buying may be expected within the next three to six months. The Toledo & Ohio Central Railroad has bought about \$50,000 worth of shop tools, of which the greater part was woodworking machinery. The Virginian Railroad and the Seaboard Air Line are about ready to close on several tools which were negotiated for recently and the Santa Fe is expected to buy five lathes shortly and has added a 52-in. boring mill to the tools for which it is still negotiating. The Mis-

souri, Kansas & Texas is expected to come into the market shortly for equipment for a new machine shop now being constructed. The Ulster & Delaware has bought a car wheel press and the New York Central a radial drill, the latter road still has several additional tools under consideration.

The Cincinnati machine-tool builders report a healthy improvement during the early part of October. Prospects of a moderate volume of buying during the fall and winter grow more encouraging, they report. An especially encouraging feature is the receipt of a number of export orders and inquiries. One Cincinnati manufacturer received orders totaling \$20,000 from Cuba and South America, the purchasers being the United Fruit Co. and the Colombian Railways. An inquiry for five lathes for shipment to Brazil is active and the order may be placed this week.

School buying continues to show promise. The Manchester, N. H., schools have practically closed on 14 metalworking tools and a number of woodworking machines and the Buffalo schools have bought several tools from a Cincinnati builder. The New York Board of Education will shortly issue formal request for bids on about 100 tools for seven schools, in five of which all machines will be motor driven.

The East Jersey Pipe Co., New York, has inquired for about 10 large fabricating machines and three cranes and the Harrisburg Machine Co., Harrisburg, Texas, will shortly buy three tools.

Prices on a number of open lines have been reduced, details being given in the Chicago market report.

New York

NEW YORK, Oct. 11.

The outstanding development of the week in the local machine-tool trade was the issuance of a list of about 40 machines by the Delaware, Lackawanna & Western Railroad, the first railroad list of this size to be figured on in the East in a considerable time. These tools are understood to cover the 1922 requirements of the road, but it is not known whether purchases will be made this fall. It is intimated, however, that if prices are favorable the purchase may go through. The equipment, with installations, would total about \$200,000. The following are the tools on which prices are requested:

For East Buffalo Shops

One vertical punch and shear, double end, 18-in. throat.
One 44-in. vertical turret lathe.
One 500-ton car wheel press.
One 20-in. vertical drilling machine.

For Elmira Shops

One 30-in. vertical drilling machine.

For Keyser Valley Shops

One 500-ton double-end car wheel press.
One 48-in. vertical car wheel boring machine.

For Scranton Locomotive Shops

One 54-in. engine lathe.
One 30-in. engine lathe.
Two 20-in. engine lathes.
Three 18-in. engine lathes.
One Morton new type heavy duty draw shaper, 36-in. stroke.
One Morton new type heavy duty draw cut shaper, 30-in. stroke.
One 24-in. Dill slotter.
One Gould & Eberhardt heavy duty 32-in. shaper.
One 60-in. heavy duty radial drill.
One Sellers vertical special driving box boring machine.
One horizontal boring and drilling machine, 4½-in. spindle.

One Bullard 42-in. vertical turret lathe, new era type.
One universal grinder, 12-in. swing.
One plain horizontal heavy duty milling machine.
One Bullard 54-in. vertical turret lathe, new era type.
One Morton 60-in. combination cylinder planing and boring machine.

One McCabe pneumatic cold flanging machine.
Two centering machines, 4-in. capacity, Whiton preferred.
One power hack saw, motor driven.
One reverse motor drive for Sellers planer, 48 x 48 in.
Two reverse motor drives for Niles-Bement-Pond planers, 42 x 42 in.

One reverse motor drive for Sellers planers, 36 x 36 in.

For Kingsland Shops

Two 18-in. engine lathes.
One 26-in. engine lathe.
One Morton improved type heavy duty draw cut shaper, 36-in. stroke.

For Secaucus Shops

One gap engine lathe, 25 to 29 in. swing.
One Bullard 42-in. vertical turret lathe, new era type.

For Secaucus Repair Tracks

One No. 1 J. A. Fay & Egan improved variety saw.
One vertical punch and shear, double end, with 18-in. throat.

In addition to the above there is electrical equipment for operating the machines, many of which are to be motor driven.

Quotations are being received by C. C. Hubbell, purchasing agent, 90 West Street, New York.

The East Jersey Pipe Co., 7 Dey Street, is inquiring for equipment, new or second hand, for a fabricating shop. Its requirements include three cranes, a 30-ft. bending roll, 12-ft. bending roll, 12-ft. hydraulic riveter, 30-ft. plate planer, 12-ft. plate planer, three 18-in. punches and shears and a few other machines.

These inquiries are larger than any that the Eastern machine tool trade has figured upon in some time. Otherwise

business continues rather dull, buying being confined very largely to single tools. The New York Central has purchased a 8-ft. radial drill and the Ulster & Delaware Railroad has bought a car wheel press, but no other railroad buying is reported.

THE IRON AGE has received an inquiry from the Harrisburg Machine Co., Inc., Harrisburg, Tex., for a 3-ft. radial drill, 250 or 300-lb. trip hammer and one bolt cutting machine, capacity up to 1½ in. F. D. French is general manager.

A New York company has purchased the following used machines from the Donahue Steel Products Co., People's Gas Building, Chicago: One 1-in. Ajax upsetter, one 2-in. Acme upsetter, one No. 4 Williams-White bulldozer, one No. 2 Williams-White eye bender, one 3-spindle 1-in. Landis threading machine, one single-spindle 3-in. Acme threading machine, one 200-lb. Bradley upright helve hammer, one Long & Alstatter multiple punch and one Pawtucket heading machine.

Activity continues in the locomotive crane field, particularly in inquiries for second hand cranes, while electric overhead and hand power cranes continue consistently dull. So great is the confidence of dealers in second-hand locomotive cranes in the immediate future of this field, that they are beginning to purchase outright instead of selling on a commission basis, the prevailing method for some time. The East Jersey Pipe Corporation, 7 Dey Street, New York, which has an inquiry out for machine tools, includes three electric cranes in the list. The American Locomotive Co., has revised its inquiry for a 3-ton, 47-ft. span electric crane, which was of somewhat special design, to call for a standard overhead traveling crane. This company also is negotiating for about 14 electric hoists. The Batavia Car works has purchased a 16-ton, 20-ft. span hand power crane. The Power Construction Co., Worcester, Mass., has revived its old inquiry for a 15-ton, one motor crane. Perin & Marshall, consulting engineers, New York, will close this week on a 5-ton, 38-ft. span hand power crane for Calcutta, India. The Erie Railroad's 8-ton hand-power crane for the Forest City colliery was purchased from the Roeper Crane & Hoist Works.

Recent sales include: Shaw Electric Crane Co., one 10-ton, four 5-ton and three 3-ton electric overhead cranes to the Porcupine Co., Bridgeport, Conn.; Shepard Electric Crane & Hoist Co., a 4-ton, 70-ft. span, grab bucket crane to the Knoxville Fertilizer Co., Knoxville, Tenn.; Northern Engineering Works, a 5-ton, 38-ft. span overhead traveling crane to the city of Des Moines, Iowa; Reading Chain & Block Corporation a 10-ton, 36-ft. span hand power crane to the International Paper Co., 30 Broad Street, New York.

The Martin-Parry Corporation, 560 Jackson Avenue, Long Island City, N. Y., manufacturer of automobile bodies, with headquarters at York, Pa., has leased a section of the former works of the United States Engineering Corp., recently acquired by the Schwab Industrial Terminal Co., at Kearny, N. J., for the establishment of a new plant.

The Recordophone Co., New York, has been incorporated with a capital of \$70,000 by A. M. Frost, C. H. Hussey and J. F. O'Brien, to manufacture sound-recording instruments, talking machines, etc. It is represented by Randolph & O'Brien, 320 Broadway.

The Standard Boiler Mfg. Co., Brooklyn, has been incorporated with a capital of \$100,000 by N. Cooper, I. J. Dinkore and P. Kaplan, to manufacture boilers, tanks and other plate products. It is represented by Samuel Rabino-witz, 149 Broadway, New York.

The American Railway Appliance Co., New York, has been incorporated with a capital of \$250,000 by P. J. Linnekin, A. K. Porter and W. A. Bergen to manufacture railroad equipment and appliances. W. Stuart Symington, Maryland Trust Building, Baltimore, represents the company.

The Queensboro Gas & Electric Co., 347 Central Avenue, Far Rockaway, L. I., has plans under way for remodeling the two three-story building on Clinton Street, 93 x 95 ft., for a service and repair works for company automobiles and trucks; a machine shop will be installed.

The O. & R. Electrical Supply Co., Monroe, N. Y., has been incorporated with a capital of \$100,000 by A. J. Crane, R. W. Smith and F. Durland, Monroe to manufacture electrical equipment and supplies. It is represented by E. C. Smith, Newburgh, N. Y.

The Fibre Tire & Rubber Corporation, New York, has been incorporated under Delaware laws with capital of \$5,000,000 to manufacture automobile tires and other rubber goods, fibre products, etc. It is represented by the United States Corporation Co., 65 Cedar Street.

The American Cork Specialty Co. and the Compressed Cork Co., 461 Eighth Avenue, New York, manufacturers of insulation and cork products, have been merged with L.

Mundet & Son, same address, manufacturer of kindred specialties, under the latter name.

A one-story machine and repair shop will be installed in the new automobile service building, 112 x 115 ft., to be erected by the Gretch Engineering Corporation, 161 Park Avenue, New York, for Lewis Stevenson, Borden and Van Dam Avenues, Long Island City, estimated to cost about \$65,000. John M. Baker and Charles L. Koester, 9 Jackson Avenue, Long Island City, are architects.

The Truck Grip Chain Co., New York, has been incorporated with a capital of \$50,000 by R. I. Brons, L. Mockridge and E. W. Searing to manufacture skid chains and other chain products for automotive series. Hills & Hills, 154 Nassau Street, represent the company.

The Carbondale Mfg. Co., Inc., New York, has been incorporated with a capital of \$200,000 to manufacture abrasives and affiliated products. It is represented by J. F. McDavitt, 149 Broadway.

The Wyoming Valley Coal Co., 163 Sixth Street Brooklyn, has acquired adjoining property at Sixth Street and Second Avenue, and plans the immediate installation of new coal-handling machinery and other equipment, in connection with a series of coal pockets to be constructed.

The Able Auto Lock Mfg. Co., New York, has been incorporated with a capital of \$150,000 by J. F. Hennessey, R. Coleman and F. J. Gannon, to manufacture locks and locking devices for automobile and other service. It is represented by F. L. Hackenbourg, 261 Broadway.

The Pardee Steel Corporation, Perth Amboy, N. J., has filed notice of incorporation under Delaware laws with capital of \$4,000,000 at New York for local operations. R. H. Dana, 16 East Forlieth Street, represents the company.

Fraser Brace & Co., 32 Pearl Street, New York, have taken a contract for a new hydroelectric generating plant at Great Falls, Winnipeg River, Man., estimated to cost excess of \$5,000,000, with machinery. It will be owned and operated by the Manitoba Power Co., Ltd., Winnipeg. Work will commence at once.

Freight-handling machinery will be installed on the proposed new dock to be constructed by the Department of Docks, New York, on the Hudson River, north of Spuyten Duyvil Creek, estimated to cost about \$75,000. Murray Hulbert, Pier A, North River, is dock commissioner.

The Atlas Alloy Steel Corporation, New York, has been incorporated under Delaware laws with capital of \$100,000 to manufacture iron and steel products. It is represented by the Corporation Trust Co. of America, du Pont Building, Wilmington, Del.

The Davis Transportation Co., Mamaroneck, N. Y., has had plans prepared for a one-story automobile service and repair works for company cars and trucks, 54 x 100 ft.

The Bolinders Co., New York, has been incorporated under State laws to manufacture internal combustion engines and parts, etc. The incorporators are A. S. Warner and S. Clausen, both of New York. The company is represented by M. E. De Agiero, 52 William Street.

Peter A. H. Jackson, 106 Lexington Avenue, New York, has filed plans for a one-story forge shop, 20 x 45 ft., at 343 East Thirty-fourth Street.

Officials of the Save Electric Corporation, 254 Thirtieth Street, Brooklyn, are organizing a new company to operate the new plant to be erected at Toledo, Ohio. The first unit will be two stories, 70 x 390 ft., providing about 50,000 sq. ft. of manufacturing space for the production of incandescent lamps and other electrical specialties. The initial plant will be extended with other units at an early date. The machinery installation is estimated to cost about \$200,000 and considerable special equipment will be installed. Employment will be given to about 250. Max Ettinger is president.

George White & Co., Inc., Jersey City, N. J., has been incorporated with a capital of \$200,000 by Edward R. Kressy, Arthur R. Dunn, and George White, 18 Morris Street, to manufacture machinery and tools.

The M. W. Kellogg Co., 117 West Side Avenue, Jersey City, N. J., manufacturer of pipe, fittings, power equipment, etc., is completing plans for a new three-story building.

Freight-handling equipment and other mechanical apparatus will be installed on the new steel pier to be constructed by the Erie Railroad Co., Jersey City, N. J., at the foot of Twelfth Street, estimated to cost in excess of \$500,000. The structure will replace a wooden pier, destroyed by fire, Oct. 1.

The Vulcan Iron Works, Hudson Street, Jersey City, N. J., is taking bids for the erection of a new power plant to replace a structure recently destroyed by fire. It will cost about \$40,000.

The Dalite Lamp Co. of New Jersey, Jersey City, N. J., has been incorporated with a capital of \$50,000 by A. Carell and Warren Dixon, 665 Newark Avenue, to manufacture electric lamps.

A new one-story power house will be erected by the Brunswick Laundry, 222 Tonnelles Avenue, Jersey City, N. J.

W. A. Jones, Mount Holly N. J., is taking bids through Folsom & Stanton, 10 South Eighteenth Street, Philadelphia, architects, until Oct. 20, for a one and two-story service and automobile repair building, 100 x 200 ft., estimated to cost about \$75,000. A list of tools for installation has been prepared.

The Common Council, Salem, N. J., will receive bids until Oct. 24 for high and low pressure pumping machinery for the municipal water-works plant. W. B. Dunn, city recorder, is in charge. W. H. Boardman, 426 Walnut Street, Philadelphia, is engineer.

The American Stamping Co., 238 Third Street, Elizabeth, N. J., manufacturer of metal toys, has leased space in the building at Pine and Third streets, totalling about 50,000 sq. ft., for a new plant.

The Patent Spring Bed Co., Newark, has been incorporated with a capital of \$60,000 by V. E. Husbands, Nathan and Isaac M. Shaw, 203 Norfolk Street, to manufacture spring bedsteads, bed springs, etc.

The Witherbee Storage Battery Co., 649 West Forty-third Street, New York, manufacturer of electric storage batteries, has acquired the former plant of the United Filters Corporation, 355-73 Cortlandt Street, Belleville, N. J., which recently moved its works to Hazleton, Pa. The property consists of a two-story factory and several one-story buildings on site 150 x 200 ft., and will be improved by the new owner for early occupancy.

The Traf-O-Lite Sales Co., Newark, has been incorporated with a capital of \$100,000 by Minor P. Wetmore, Grover C. Kayhart and Cleveland Quackenbush, Newark, to manufacture mechanical devices for automobile service. The company is represented by Samuel M. Hollander, 790 Broad Street.

Igoe Brothers, Poinier Street, Newark, manufacturers of wire nails and other wire products, have completed plans for a one-story addition, and will take bids at once. A new power house will also be constructed.

Philadelphia

PHILADELPHIA, Oct. 10.

The Department of Public Works, City Hall, Philadelphia, is having plans prepared for a new one-story service and repair building for municipal automobiles and trucks.

John P. Smith, Inc., Philadelphia, has been incorporated with a capital of \$50,000 to manufacture heating equipment, heating systems, etc. John P. Smith, 632 South Fifth-sixth Street, is treasurer.

B. Bernheim & Sons, Inc., 1401 Germantown Avenue, Philadelphia, manufacturer of show cases, store fixtures, etc., has awarded contract to Potts Brothers & Cooperson, 129 North Eleventh Street, for a four-story and basement addition, 58 x 60 ft.

The Penn Rubber Ball Corporation, Philadelphia, has been incorporated under Delaware laws with capital of \$5,000,000 to manufacture rubber products. It is represented by the Corporation Guarantee & Trust Co., Land Title Building.

A one-story power house will be erected by the Forrester Laundry Co., 1225 Columbia Street, Philadelphia.

The Frank Pettit Ornamental Iron Works, 805-9 Master Street, Philadelphia, has awarded contract to Harry Kuehnlein, 2046 Trenton Avenue, for a two-story addition, 99 x 108 ft.

The Niagara Mfg. Co., 1042 Ridge Street, Philadelphia, manufacturer of pipe, heating and plumbing specialties, etc., has leased property at 3827 Pearl Street, for extensions.

The Metropolitan Body Co., Philadelphia, has been chartered under State laws to manufacture automobile bodies. Rush H. Hartman, 4712 North Hutchinson Street, is treasurer.

The Police Bureau, Philadelphia, has plans under way for a new machine and wood-working repair shop, in connection with a new traffic truck and vehicle building, estimated to cost close to \$200,000, with equipment. F. C. Dunlap, City Hall, is engineer.

The Frank C. Millner Co., Trenton, N. J., has been incorporated with a capital of \$250,000 by R. Millner, Jacob Vine and A. S. Lewis to manufacture iron and steel products. It is represented by Alexander Budson, 137 East State Street.

J. H. Dickinson, Chester, Pa., has acquired a building at Third and Tilghman streets for the establishment of a new plant to manufacture small steel products. A new company will be organized and it is proposed to have the building ready for operation by the close of the year.

The Travelers' Rubber Co., Bethlehem, Pa., will install new machinery and equipment at its plant to cost about \$25,000.

The Williamsport School District, Williamsport, Pa., will receive bids until Oct. 19 for three motor-driven engine lathes for the local manual training school. H. A. Sterner, 229 West Third Street, is secretary.

Dittmar Brothers, 618 Day Street, Williamsport, Pa., manufacturers of composition tile and kindred products, have perfected plans for a new two-story factory, 57 x 185 ft., estimated to cost about \$40,000.

The Union Ice & Coal Co., Forster Street, Harrisburg, Pa., will complete plans at once for a new ice-manufacturing plant with capacity of about 100 tons a day, with machinery, estimated to cost about \$200,000. A new cold storage plant, with capacity of about 5000 tons, will also be constructed.

The Pennsylvania Power & Light Co., Allentown, Pa., has acquired the property of the Wilkes-Barre Electric Light Co., Wilkes-Barre, Pa., and contemplates extensions and improvements in the plant and system.

The Ohio Generating Co., Red Lion, Pa., recently organized, has plans under way for a new factory to manufacture farm lighting plants and systems. C. S. LaMotte is president and Charles C. Meads, secretary, both of Red Lion.

The Harrisburg Railways Co., Harrisburg, Pa., is completing plans for an addition to its power plant, estimated to cost about \$75,000.

A two-story machine shop and service works for company trucks will be erected by the M. & G. Ice Cream Co., Allentown, Pa., 54 x 88 ft., in connection with a new three-story factory. The building contract has been let to the William Steele & Sons Co., Sixteenth and Arch streets, Philadelphia.

New England

BOSTON, Oct. 10.

September sales were better than August, one dealer having doubled its volume over the preceding months. The manual training schools of Manchester, N. H., including the practical arts high school and the west side high school, have about closed on wood-working and 14 metal-working machines, including two 20-in. Sibley upright drills; one Sipp sensitive drill; one Milwaukee No. 1B milling machine; one Flathery 14 in. x 6 ft. geared head lathe; two Monarch lathes, 12 in. x 6 ft. and 14 in. x 8 ft.; two Le Blond 11 in. x 5 ft. speed lathes; one Cincinnati double-head grinder; one Wells No. 190 cutter and reamer grinder; one Hendey 16-in. shaper; two Star engine lathes, 9 in. x 5 ft. The Delaware, Lackawanna & Western Railroad has a list of 35 tools in this market and will buy if prices are low enough. The list is published in full in the New York market.

An auction sale which is expected to bring forth considerable interest is that of the plant and equipment of the Chapman Mfg. Co., Winchester, Mass., ball-bearing spindles, on Oct. 13 and 14. The machine tools include universal, automatic, plain, cylindrical, internal, hand grinding and milling machines; Gridley and Acme automatic screw machines; floor and bench screw cutting engine and turret lathes; upright and sensitive and multiple spindle bench and floor drills; bench and floor tapping machines and arbor presses; bench polishing machines; Bradley hammers; gas furnaces and blacksmith's equipments; electric motors; also 149 tons of steel; leather belting and lots of mechanical small equipment.

The Bush Mfg. Co., airplane, tractor and truck radiators, Hartford, Conn., has bought the property of the Ellison Construction Co., occupied by the American Machine Co. on Wellington Street. It comprises three acres with a 300-ft. frontage, containing a factory, storage house and other buildings.

R. S. Peck & Co., 26 High Street, Hartford, Conn., have had plans drawn by Buck & Sheldon, architects and engineers, Hartford, for a new one-story brick plant, 100x104 ft., at the corner of Franklin Avenue and Bolton Street.

The Easthampton Foundry Co., Railroad Street, Easthampton, Mass., has filed plans for a new one-story foundry, 40 x 50 ft., with extensions, 16 x 20 ft., estimated to cost about \$30,000. L. A. Moackel is president.

The Brass Products Foundry Co., 341 Eddy Street, Providence, R. I., has filed notice of organization to manufacture brass, bronze and other metal castings. Benjamin T. Peck, 249 Eddy Street, heads the company.

The Crocker Tool Co., Stockton Springs, Me., has been chartered under state laws to manufacture tools and other products. James M. Crocker, Stockton Springs, is president and treasurer.

The Crane Co., Bridgeport, Conn., manufacturer of valves, steam fittings, etc., with headquarters at Chicago, will discontinue the manufacture of brass valves and other brass

goods at its local plant, transferring this branch of production to Chicago. The Bridgeport works will concentrate on the manufacture of iron products.

The Richard French Iron Works, Muskego Street, Worcester, Mass., has awarded a contract to the E. D. Ward Co., 32 Foster Street, for the initial buildings for its new plant at Millbury, Mass., 65 x 120 ft., and a one-story structure, 25 x 25 ft. Raymond Tracy is president.

The Gibby Foundry Co., Wakefield, Mass., is planning to immediately rebuild the portion of its plant destroyed by fire, Oct. 4. It has been giving employment to about 50 operatives.

The New England Tire & Rubber Co., South Main Street, Holyoke, Mass., is planning for the installation of new equipment in its machine shop. E. Kerns is vice-president.

The Revere Rubber Co., Chelsea, Mass., manufacturer of mechanical rubber goods, has awarded contract to the Trednick Co., 10 High Street, Boston, for a one-story addition to cost about \$20,000.

The Locomobile Co., Bridgeport, Conn., has withdrawn from its affiliation with Hare's Motors, Inc., Trenton, N. J., and in the future will operate independently its local plant. New officers include: Elmer H. Havens, president; F. R. Hickman, vice-president and treasurer, and E. A. Travis, general sales manager, all of Bridgeport.

The Files Engineering Co., Inc., Bridgeport, Conn., will establish a department for the manufacture of a new type of temperature controller for use at rubber plants and other mechanical drying works.

Potter Brothers, Malden, Mass., have completed plans for a two-story automobile repair and service building, 80 x 115 ft., estimated to cost \$100,000 with equipment.

Pittsburgh

PITTSBURGH, Oct. 10.

The machine-tool market remains extremely quiet. The National Radiator Co. has placed the 3-ton crane for its New Castle, Pa., plant with the Cleveland Crane & Engineering Co., Wickliffe, Ohio. This still reduces the live crane prospects to that of the National Tube Co. for its Christy Park Works, McKeesport, Pa. Bids on these cranes have not yet been tabulated and an award is still some time off. New inquiries are few.

The Clearfield Machine shops, Clearfield, Pa., have placed a 5-ton 29-ft. 5-in. span one motor electric traveling crane with the Roeper Crane & Hoist Works, Reading, Pa.

The North Pole Ice Co., Twelfth and West Carson Streets, Pittsburgh, has awarded a contract to Joseph F. Love & Co., Pittsburgh, for its seven-story addition, 100 x 192 ft., estimated to cost about \$400,000 with machinery.

The Moorhead Electric Machinery Co., Pittsburgh, has been chartered under State laws to manufacture electrical machinery and parts. I. R. Moorhead, 3417 Kedzie Avenue, is treasurer.

The West Penn Power Co., Pittsburgh, has arranged for a bond issue of \$1,500,000, for its subsidiary organization the Allegheny Pittsburgh Coal Co., and whose entire production is used by the parent organization, for general operations, extensions, etc.

The Dungan & Coe Welding Co., Pittsburgh, has been incorporated under Delaware laws with capital of \$50,000 by R. G. Dungan, George C. Neidhart and Joseph Harris, Pittsburgh, to establish a local machine and welding works. It is represented by the Capital Trust Co. of Delaware, Wilmington, Del.

The Stonecrete Corporation, Pittsburgh, has acquired property at Cheswick, with frontage of about 1100 ft. along the Allegheny River, as a site for a new plant to manufacture concrete forms and similar products. Plans will be prepared and construction commenced at an early date.

The Senior Mfg. Co., Pittsburgh, has been chartered under State laws to manufacture hardware and other metal products. C. C. Kohne, 216 Tennyson Avenue, is treasurer.

McLean & McGinness, 366 Stratford Avenue, Pittsburgh, manufacturers of wagon parts, etc., have taken bids for the extension and improvement of their five-story plant, 40 x 100 ft., estimated to cost about \$45,000. John L. Beatty, Jackson Building, is architect. James H. McLean heads the company.

The Kanawha White Ash Collieries Co., Dorfee, W. Va., is planning for the installation of new electrical and other machinery at its properties. E. M. Burns, Ebensburg, Pa., is president.

The Waugh Foundry & Machine Co., Williamson, W. Va., has commenced the erection of a new plant which it expects to have ready for service early in November.

The Ferres Motors Co., Parkersburg, W. Va., has completed plans for a new two-story service and repair works,

50 x 140 ft., on Seventh Street. D. P. Ferres heads the company.

C. B. Hawley, 450 Munsey Building, Washington, and associates, have made application for permission to construct a new hydroelectric generating plant at Sandstone Falls, on the New River, at Fayetteville, W. Va. The initial capacity will aggregate about 4000-h.p.

C. A. Werble, Charleston, W. Va., and associates are planning the establishment of a new factory at Huntington, W. Va., for the manufacture of plated ware products.

Chicago

CHICAGO, Oct. 10.

One prominent dealer reports a fair number of sales of individual machines the past week, but other local houses find the market as quiet as ever. The Santa Fe has added a 52-in. motor-driven boring mill to its outstanding list. The purchase of these machines, however, is not expected to be consummated until the close of the year. Two other large Western lines are known to be surveying their tool requirements, and while one may issue an inquiry in the near future, the other will probably defer action until early next year. Business from large industrial companies is entirely lacking and such orders as are being booked by local dealers come principally from automobile repair shops and other small users.

Prices on a number of open lines have been reduced. The Canedy-Otto Mfg. Co., Chicago Heights, Ill., maker of radial drills, engine lathes, portable forges, etc., has announced a reduction of 10 per cent. The Silver Mfg. Co., Salem, Ohio, has marked down its upright drilling machines from 5 to 10 per cent. The J. N. La Pointe Co., New London, Conn., has published a new list on broaching machines which, it states, brings prices down to the 1915 level. The Hendley & Whittemore Co., Beloit, Wis., has reduced its line of punches and shears and bending rolls 20 per cent. Reductions of from 10 to 15 per cent on grinding machines have been made by the Safety Emery Wheel Co., Springfield, Ohio, and a cut of 10 per cent on bolt cutters is announced by the Universal Machine Co., Bowling Green, Ohio.

The Niagara Radiator & Boiler Co., North Tonawanda, N. Y., has let contract for a foundry and shop, 132 x 400 ft., at 1101-13 Eighty-third Street, Chicago, to cost \$100,000.

The Prudential Theatre Co., 806 West North Avenue, Chicago, has been incorporated with \$100,000 capital stock by C. B. White, Jacob Binger and Leo J. Kramer to manufacture moving picture machines. At present the company is subletting its manufacturing work, but expects to do its own work eventually.

T. L. Robinson & Co., Inc., 1458 West Kinzie Street, Chicago, has been organized with \$5,000 capital stock by Robert J. Pyne, Richard C. Luhman and John Stresser to manufacture metal specialties.

The Perfection Battery Mfg. Corporation, Room 1130, 134 South La Salle Street, Chicago, has been organized with \$25,000 capital stock to manufacture storage batteries. The incorporators include William C. Boyden, Jr., William K. Otis and Laird Ball. The company has not yet acquired factory space.

The Franklin Light Co., care Well & Chaiken, 127 North Dearborn Street, Chicago, has been incorporated with \$10,000 capital stock by Harvey Adams, Benjamin J. Kanne and Genevieve Litka to manufacture electrical fixtures. It has not yet acquired factory space.

The F. L. Klein Noodle Co., 3713 Wentworth Avenue, Chicago, has let contract for a one-story factory, 4561-5 State Street, to cost \$40,000.

A controlling interest in the La Salle Tool Co., La Salle, Ill., has been acquired by the Western Clock Co. The La Salle company will continue to manufacture grinders and to do repair and job work, as in the past.

The city of Lincoln, Neb., has awarded contract for a pumping station to cost \$100,000.

The New Owatonna Mfg. Co., manufacturer of drills, seeders and ensilage cutters, has laid the foundations for a \$200,000 plant on West Fifth Street, Winona, Minn. Frank D. Chase, Inc., Chicago, is architect and engineer.

The Duty Motor Truck Corporation, 19 North Spring Street, Elgin, Ill., will break ground at once for a new one-story plant, 125 x 250 ft., estimated to cost about \$75,000. W. H. Reuther is president.

The Charter Gas Engine Co., 9 Wallace Street, Sterling, Ill., has been incorporated with a capital of \$107,800 by William S. McCloy, Arthur L. Haglund and William A. Robinson, to manufacture gas and gasoline engines.

The G. A. Ball Bearing Co., 3051 West Lake Street, Chicago, is having revised plans prepared for its new one-story plant at Albany Avenue and West Lake Street, 200 x

230 ft., estimated to cost about \$70,000. Burrett H. Stephens, 37 West Van Buren Street, is architect.

The Penokee Iron Co., Duluth, Minn., has been incorporated under Delaware laws with capital of \$1,000,000 by Walter B. and Edward C. Congdon, and Harry C. Dudley, Duluth, to manufacture iron products. It is represented by the Corporation Service Co., Wilmington, Del.

A. J. Clark, 833 Mulford Street, Evanston, Ill., will take bids at once for a new one-story machine shop and automobile service works, 32 x 213 ft., at Sixty-ninth Street and Stony Island Avenue, Chicago, estimated to cost about \$45,000.

Baltimore

BALTIMORE, Oct. 10.

The Paragon Motor Co., First National Bank Building, Cumberland, Md., has awarded a general contract to William J. Morley, Cumberland, for the superstructure of its new plant, foundations for which have been laid. The main building will be one-story, 168 x 480 ft. Philip W. Blake is president.

The Tin Decorating Co. of Baltimore, Boston Street, Baltimore, manufacturer of tinware products, has leased a building at 2407-9 Eastern Avenue for extensions.

The Herculo Lock Guard Co., 500 Lobe Building, Baltimore, has been incorporated with a capital of \$100,000 by William C. Jones, Frederick J. Sampson and George M. Donaldson, to manufacture metal lock guards, etc.

The Cyl-Lap Products Co., Baltimore, has been incorporated with a capital of \$1,500,000 by Michael S. Coan, David L. Schiller and Robert F. Leach, Jr., Central Savings Bank Building, to manufacture abrasive products.

The Franklin Motor Car Co., Charles and Biddle streets, Baltimore, will install a machine and repair department in its new building, 40 x 150 ft., contract for which has been awarded to the Consolidated Engineering Co., Calvert Building, estimated to cost about \$100,000. Otto G. Simonson, Maryland Casualty Tower Building, is architect.

The Avon Specialties Co., 44 Market Place, Baltimore, recently organized with a capital of \$150,000, is arranging for the early operation of a plant for the manufacture of gasoline measuring devices. William L. Thaxton is president and Clarence A. Creidler, secretary and manager.

The Red "C" Oil Mfg. Co., Keyser Building, Baltimore, has tentative plans under way for new works at Key Highway and Lawrence Street. It is now operating at Highlandtown. William H. Fehsenfeld is president.

The Leavitt-Newton Co., Wilmington, Del., has been incorporated under State laws with capital of \$160,000 to manufacture machinery and tools. It is represented by the Corporation Trust Co. of America, du Pont Building, Wilmington.

The Keystone Refractories Co., Wilmington, Del., has been incorporated under State laws with capital of \$600,000 to manufacture firebrick, furnace linings, fire blocks and other refractories. It is represented by the Corporation Service Co., Wilmington.

The Ellicott Machine Corporation, 1111 Bush Street, Baltimore, will dispose of its surplus war plant, including machinery. Bids are being taken until Oct. 28 for machine tools, traveling cranes, power house equipment, etc.

The Auto Parts Co., 104 North Front Street, Baltimore, recently organized with a capital of \$100,000, is planning for the installation of machinery in a local building to manufacture automobile parts and other products. John and George Beck head the company.

Transmission and power equipment and other apparatus will be installed by the Western Maryland Dairy Co., 1111 Linden Avenue, Baltimore, at its new plant estimated to cost about \$500,000, including machinery. Construction will commence at once.

The Acme Mfg. Association, Wilmington, Del., has been incorporated with a capital of \$2,000,000 to manufacture refrigerating and ice-making machinery. It is represented by the Capital Trust Co. of Delaware, Dover, Del.

A one-story service and repair building, 50 x 80 ft., for company trucks will be erected by the Clover Dairy Co., Twelfth and Orange streets, Wilmington, Del.

The Chapman Self-Locking Nut Co., 721 Equitable Building, Baltimore, has plans under way for its new works to manufacture special lock-nuts. The company is organized with a capital of \$1,000,000 and headed by H. D. Chapman.

The Vicama Mica Co., 3 Hamilton Row, Hagerstown, Md., is planning for the installation of new equipment at its properties in Virginia, including crushing and pulverizing machinery and general quarrying equipment.

The Bureau of Yards and Docks, Navy Department, Washington, is having revised plans prepared for additions to the power plant at Yorktown, Va., including the installation of new equipment, and will call for new bids at an early date.

The Savannah Electric & Power Co., Savannah, Ga., has been incorporated under State laws with a capital of \$4,800,000 to take over and operate the power plants and property of the Savannah Electric Co. Arrangements have been made for a bond issue of \$1,750,000, the proceeds to be used for general operations, extensions, etc. A. A. Lawrence is president.

Haines, Jones & Cadbury, Inc., 1136 Ridge Avenue, Philadelphia, manufacturer of steam fittings, plumbing supplies, etc., has preliminary plans under way for a new three-story and basement building, 60 x 150 ft., at Charlotte, N. C., for branch works, estimated to cost about \$100,000.

The Common Council, Pilot Mountain, N. C., is arranging for a bond issue of \$50,000 for a new municipal hydroelectric power plant on the Ararat River.

The American Elementary Electric Co., 20 East Lexington Street, Baltimore, recently organized with a capital of \$250,000, proposes to operate a local plant for the manufacture of electric storage batteries of special type. George S. Engle is president and general manager, and Theodore C. Lewis secretary.

The Asheville Power & Light Co., Asheville, N. C., will commence the immediate erection of a new generating plant to cost about \$200,000.

The Trail Blazers Association, Asheville, recently organized under State laws, proposes to operate a plant for the manufacture of automobile tires and tubes. It is headed by L. L. Rose and M. K. Thomas, Asheville.

The Southern Gypsum Co., North Holston, Va., is planning for the installation of new crushing machinery and other equipment at its plant. The company recently increased its capital to \$750,000 for expansion. Frank A. Wilder is president.

The Atamantex Brick Co., Baltimore, has acquired 25 acres on Sulphur Springs Road, upon which it is planned to erect works. Louis F. Ducker is president.

Buffalo

BUFFALO, Oct. 10.

The Ferguson-Allan Co., Buffalo, recently organized, has acquired the property of the Progressive Structural Steel Co., Bailey Avenue, and will begin operations at an early date for the manufacture of structural steel products. A complete fabricating works will be conducted. James E. Ferguson, formerly head of the Ferguson Steel & Iron Co., 1399 Bailey Avenue, heads the company.

Henry Landsheft, 1202 Jefferson Street, Buffalo, manufacturer of automobile bodies, has awarded contract to the Lackawanna Bridge Co. for a one-story addition, 35 x 100 ft., to cost about \$25,000.

The Loveland-Buffalo Corporation, Buffalo, has been incorporated with a capital of \$1,050,000 under Delaware laws to manufacture automobile engines and parts. It is represented by the United States Corporation Co., 65 Cedar Street, New York.

Fire, Oct. 4, destroyed the plant of the Precision Engineering Co., Jamestown, N. Y., manufacturer of tools and engineering appliances, with loss estimated at about \$55,000.

The Parcel Delivery Co., 220 Franklin Street, Rochester, N. Y., will build a new one-story repair and service works, 44 x 125 ft., for company automobiles and trucks, estimated to cost about \$30,000.

The Adams Basin Electric Light & Power Co., Adams Basin, N. Y., has been organized to operate a local electric light and power plant. It is headed by J. J. Glinther and G. R. Ward, Adams Basin.

The Harder Mfg. Co., Ryder Avenue, Cobleskill, N. Y., manufacturer of silo fillers and other farm implements, has completed plans for a new two-story building, 60 x 200 ft.

The Lamson Co., Lowell, Mass., manufacturer of pneumatic tubes, merchandise carriers and other conveying equipment, is taking new bids for its new plant at Syracuse, N. Y., estimated to cost in excess of \$500,000.

The Wallington Cold Storage & Ice Co., Sodas, N. Y., has been chartered under State laws to operate a local ice-manufacturing and cold storage plant. It is headed by J. J. Appel, B. B. and M. M. Kelly, all of Sodas.

The E-Z-E Spring Tape Co., Rochester, has been incorporated with a capital of \$50,000 by J. L. Hill, J. W. Fulreader and C. S. Owen, Rochester, to manufacture metal tape, etc. It is represented by Wilcox & Van Allen, Ellicott Square, Buffalo.

Indianapolis

INDIANAPOLIS, Oct. 10.

The Chevrolet Brothers Mfg. Co., Indianapolis, is arranging for the early removal to its new two-story plant, 80 x 100 ft., at Tenth and Payette streets. It will be used for the manufacture of cylinder heads and other automobile equipment, and will be provided with a large machine repair department. The company was recently incorporated with a capital of \$100,000. Arthur Chevrolet is president.

The Victor Bearings Co., Georgia and Pennsylvania streets, Indianapolis, recently organized with a capital of \$300,000, will take bids at once for its new one and two-story plant, 120 x 150 ft., estimated to cost about \$55,000. W. L. Sandage is president.

The Pence Mfg. Co., Warsaw, Ind., has been incorporated with a capital of \$25,000 by H. O. Pence, I. R. Klinger and G. W. Polk, all of Warsaw, to manufacture metal products and electrical specialties.

The Board of School Trustees, Lebanon, Ind., has completed plans for the erection of an electric lighting plant for public school service in Perry Township. Adolphus Smith is chairman of the board.

The Tarpenning & La Follette Co., Indianapolis, manufacturer of sheet metal products, has acquired the one-story building on the Canal, between Tenth and Eleventh Streets, for a local plant.

Cincinnati

CINCINNATI, Oct. 10.

The machinery market the first week in October showed a very healthy improvement in new bookings. Some manufacturers report the receipt of orders each day and prospects for the future are very encouraging. Railroad business in particular is improving and a canvass of this field by a manufacturer indicates that within the next 60 days lists for equipment will be issued by a number of roads. At present the Virginian Railroad and the Seaboard Air Line are about ready to close for a number of tools recently negotiated for. The Santa Fe is expected to buy at least five lathes in the immediate future and the Missouri, Kansas & Texas will, it is expected, be in the market shortly for a number of tools for a machine shop now in course of construction. An encouraging feature of the week was the receipt of several orders for export. One manufacturer booked about \$20,000 worth of tools for export to Cuba and South America, the United Fruit Co. and the Colombian Railways being the purchasers. Another manufacturer booked an order for a lathe for South America and also one for Japan. There is also an export inquiry for five lathes for shipment to Brazil, which will probably be closed this week. The Buffalo vocational school has placed an order with a local manufacturer for a number of small tools. Altogether, the situation in the machinery market is more encouraging than for many months. Local dealers also report more inquiries and more sales are being made. Used tools are moving fairly well, the largest order placed being for a radial drill and a huge planer from a manufacturer in this district.

The Randle Machinery Co., 1723 Powers Street, Cincinnati, is in the market for a 10-ft. used boring mill, with draw back housings, capable of taking work up to 16 ft., direct current motor drive preferred, but a belt-driven machine will be considered.

The Lancaster Asphalt Mfg. Co., Lancaster, Ohio, has been organized with \$100,000 capital to manufacture asphalt roofing and shingles. It has taken over the plant of the Asphalt Mfg. Co. and will occupy 50,000 sq. ft. of floor space. Edward Hettinger is president and general manager.

Detroit

DETROIT, Oct. 10.

The Mac Sim Bar Paper Co., Otsego, Mich., is having plans prepared for a new one-story power plant, 80 x 140 ft., estimated to cost about \$300,000 with machinery. Hillingham & Cobb, Press Building, Kalamazoo, Mich., are architects. A. B. Thomas is president and general manager.

The Michigan Fire Door Co., Detroit, has been chartered under State laws to manufacture metallic doors, sash, etc. The incorporators are Wilbert H. Meagher, George F. Nordman, and Clarence W. Meagher, 4218 Eighteenth Street.

The Hercules Steel Post Co., Niles, Mich., will defer the erection of its new factory until early in the spring. It will be one-story, 50 x 250 ft., and is estimated to cost about \$30,000.

The Ray Battery Co., Detroit, has been incorporated under Delaware laws with a capital of \$1,000,000 by Joseph S. McDowell and M. J. Holliday, Detroit, to manufacture elec-

tric batteries and other electrical products. It is represented by the Corporation Trust Co. of Delaware, Equitable Building, Wilmington, Del.

The Briscoe Motor Co., Jackson, Mich., has been reorganized under the name of the Earl Motors, Inc., with Clarence A. Earl, formerly first vice-president Willys-Overland Co., Toledo, Ohio, as president. It has arranged for a bond issue of \$5,000,000, a portion of the proceeds to be used for plant enlargements and the installation of additional machinery. Production will soon commence on a new automobile, to be known as the Earl.

The French Paper Co., Niles, Mich., has commenced the erection of a new power house at its plant to cost about \$75,000 with equipment. J. Parker is manager.

Ireland & Matthews, Inc., Detroit, manufacturer of parts for motors, stove parts and plumbing products, is offering a block of stock at \$11 a share to provide working capital to add to its line. William Knudsen, for 10 years with the Ford Motor Car Co. is general manager.

The Wales Co., Kalamazoo, manufacturer of the Wales gas heating system and appliances, is located in its new plant and is under production.

The Grand Rapids Metal Products Co., Grand Rapids, Mich., has been organized to manufacture furniture, refrigerator, phonograph and automobile hardware, specialties, etc., as well as to job several kindred lines of well known manufacturers. The complete plating plant of the Miller Plating Co. has been taken over. John C. Miller for 17 years with the Wolverine Brass Co., is president; E. R. Freeman, vice president, and A. William Honecker, until just recently purchasing agent for the Grand Rapids Brass Co. and Wilmarth Show Case Co., is secretary and treasurer.

Cleveland

CLEVELAND, Oct. 10.

The Toledo & Ohio Central Railroad the past week purchased about \$50,000 worth of shop equipment, which included a Chambersburg 600-ton driving wheel press, nearly all the remainder being wood-working machinery. The local market shows no signs of improvement and most of the orders placed are for single machines. Some dealers are diverting their attention from standard lines to machinery of a more special character, particularly tools designed to reduce production costs. The demand for wood-working machinery is better than for metal-working tools. Manufacturers of electrical equipment report a better volume of inquiry, particularly from coal mining companies. A Cleveland engineering and construction company has taken a contract for a foundry extension for the Standard Sanitary Mfg. Co., New Brighton, Pa.

Local manufacturers in some metal-working lines report an improvement in orders and inquiries. As a result a few plants are operating at a little better capacity than for some time, and while there has been no increase in the number of men employed, some employees have been transferred from non-productive to productive labor and others have been given more hours of work per week. Some malleable foundries have increased operations largely as a result of orders for car repair work, but the local foundry situation shows no improvement, the average operation being about 20 per cent.

Building activity in Cleveland shows an improvement, the amount involved in permits issued in September exceeding August by over \$1,000,000. Permits issued during the month aggregate \$3,965,090, as compared with \$2,761,815 in August and with \$3,364,975 in September, 1920.

The Austin Co., Cleveland, has been awarded an engineering and construction contract for a new foundry for the Standard Sanitary Mfg. Co. at New Brighton, Pa. It will have 30,000 sq. ft. of floor space and roof of the inverted type. The Austin contract also includes the demolition of existing buildings, the designing and construction of special platform features and foundations for sand blast equipment.

Joseph L. Skeldon, president the Joseph L. Skeldon Engineering Co., Toledo, Ohio, has purchased the plant and business of the McNaull Boiler Mfg. Co., manufacturer of water tube boilers.

The Marion Metallic Vault Co., Marion, Ohio, has purchased a site and will erect a plant for the manufacture of metallic vaults.

The Burns Products Co., Bluffton, Ohio, recently incorporated with a capital stock of \$5,000, will establish a plant for the manufacture of an automobile accessory. M. M. Bogart is president and C. E. Burns is secretary and treasurer.

The Tilter Co., Bucyrus, Ohio, has been organized by Ira J. Hooks and others to manufacture equipment for lifting motor cars for convenience in doing repair work. The company has placed a contract with the Young & Wheeler

Machine Shop, Bucyrus, for the manufacture of the machines.

The General Electric Co. through its Cleveland office has taken an order for electrical equipment for the Columbus Railways Power & Light Co., Columbus, Ohio. It includes rotary converters and a switchboard.

The Mt. Eagle Feldspar Co., Ltd., a Canadian corporation owning mining properties having large deposits of feldspar and fluor spar, has purchased the plant formerly occupied by the Meech Foundry Co., Cleveland, which it will convert for grinding these minerals. The plant will have a capacity of 150 tons a day. The company will also manufacture porcelain parts, especially those used in the electrical industry. J. O. Brown is president, M. B. Gordon, vice president and Curtis C. Burkett, secretary-treasurer.

The Chicago Roller Co., 554 West Harrison Street, Chicago, and 1297 East Sixth Street, Cleveland, manufacturer of printers' rollers, etc., has awarded contract to W. I. Thompson, 5103 Euclid Avenue, Cleveland, for a new two-story and basement plant at 1432-38 Hamilton Avenue, estimated to cost about \$40,000.

The American Mine Door Co., Canton, Ohio, is having plans prepared by the Austin Co., 16122 Euclid Avenue, Cleveland, for its new one and two-story plant, estimated to cost about \$100,000 with machinery.

The Studebaker-Wulff Co., Zanesville, Ohio, is negotiating for the purchase of the plant of the Rotary Tire & Rubber Co., Zanesville, now operating under a receivership.

The City Ice & Fuel Co., East Twenty-second Street, Cleveland, has perfected plans for a new one-story ice-manufacturing plant at Fisher and Warren roads, Lakewood, Ohio, to cost about \$100,000.

The plant and property of the Peerless Motor & Truck Co., Quincy Avenue, Cleveland, has been acquired by Richard Collins, former president Cadillac Motor Car Co., Detroit, and vice-president General Motors Corporation, for \$4,500,000. Mr. Collins is now associated with W. C. Durant, president Durant Motors, Inc., 1819 Broadway, New York, and has been elected president and general manager of the Peerless company.

Milwaukee

MILWAUKEE, Oct. 10.

With the exception of orders from scattering sources, usually for single machines, the machine-tool trade remains quiet and featureless. At the same time activity in inquiries is growing, but buyers are slow in closing and do an unusually large amount of shopping to get satisfactory prices. There seems to be still much used equipment in good condition available at such low cost that many times it is accepted in favor of new tools. Machine shop operations, while slowly increasing, are still of small scope.

The P. B. Yates Machine Co., Beloit, Wis., formerly the Berlin Machine Works, manufacturer of heavy wood-working equipment, will melt iron for the first time in its new foundry early this week. The building and equipment represents an investment of more than \$125,000.

The Manitowoc Church Furniture Co., Waukesha, Wis., is inquiring for steam generating equipment for a new power plant under construction. It will cost about \$30,000 complete.

The Stearns Sales Agency, 156 Farwell Avenue, Milwaukee, has purchased a site adjoining its garage and service building and will build a two-story brick and concrete addition, 55 x 120 ft., to be used as a machine and repair shop. Work on foundations will start in about two weeks. N. A. Winslow is general manager.

The Northern Wisconsin Power Co., Gillett, Wis., has been incorporated with a capital stock of \$75,000 and intends to build and operate hydroelectric generating plants. Definite information will be issued later. J. A. Read, A. L. Kreutzer and W. C. Smith are the principals.

The Board of Education, Beaver Dam, Wis., has engaged Parkinson & Dockendorff, architects, LaCrosse, Wis., to prepare plans for a new high school with manual training department, the cost not to exceed \$200,000. Work probably will not be undertaken until early in the spring. A. W. Lueck is secretary of the board.

Otto Rauchsvalbe & Co., 1017-1019 Tenth Street, Milwaukee, will break ground at once for a new wood-working, cabinet and millwork factory, 45 x 120 ft., on Thirtieth Street. It will cost about \$25,000, including equipment.

The Foute & Slater Co., Oshkosh, Wis., will build a two-story garage and sales building, 61 x 87 ft., at 261-263 Main Street. A machine and repair shop, newly equipped

will be established on the second floor. Green & Negendank, machinists, Nebraska Street, will operate the shop department.

The Milwaukee Board of School Directors, Tenth and Prairie streets, Milwaukee, has commissioned Van Ryn & DeGelleke, architects, 115 Grand Avenue, to prepare plans for new public school buildings and additions to cost \$850,000 and be constructed during the winter and spring. The work includes a new boiler room costing \$75,000 for the Second Avenue graded school and a boiler house for the Hanover Street school, costing \$65,000. Frank M. Harbach is secretary and business manager.

Thor Rosten & Co., Madison, Wis., manufacturers of tools, dies, jigs, fixtures, etc., have started work on a new building, 40 x 100 ft., at 613 Williamson Street. Some new equipment will be required. The total investment at present will be about \$20,000.

The Luick Ice Cream Co., 177 Ogden Avenue, Milwaukee, has awarded the general contract to Theo. Stark & Co., 425 East Water Street, Milwaukee, for a five-story brick and concrete addition, 60 ft. sq. It will require additional generating equipment, refrigeration, tanks, motors, etc. The improvement will cost about \$100,000, complete. Brust & Philipp, 405 Broadway, are the architects in charge.

The Schaub-Bradford Electric Co., Madison, Wis., has been incorporated with a capital stock of \$25,000 by F. J. Schaub, O. M. Bradford and A. J. Schaub to manufacture electrical devices and appliances and do contracting and general electrical repairing.

The Gulf States

BIRMINGHAM, Oct. 10.

The American Collapsible Box Co., High Point, N. C., is perfecting plans for its new plant at Jacksonville, Fla., to manufacture corrugated folding boxes. The machinery installation will cost about \$75,000.

The H. & A. Wood Products Co., St. Petersburg, Fla., manufacturer of toys, kindergarten furniture, etc., is making inquiries for a new one-story factory, 60 x 250 ft. William E. Hooker is president and H. J. Albright, secretary and treasurer.

The Magnolia Petroleum Co., Dallas, Tex., is planning the erection of a new gasoline manufacturing plant in the vicinity of Ardmore, Okla. An electric power house will also be constructed. J. A. Nicholson, Heraldton, Okla., is engineer.

The DeLand Electro Plating & Art Metal Works, DeLand, Fla., has been organized to operate a local plant for the manufacture of metal products. P. J. Thompson is president and C. A. J. Springthorpe, secretary.

The Vero Ice Co., Fort Pierce, Fla., is planning for the immediate installation of new machinery to increase the capacity of its plant to about 40 tons per day.

The Southern Furniture Co., Oldsmar, Fla., recently organized with a capital of \$50,000, is perfecting plans for the establishment of a new plant. G. A. McNally is president.

The St. Lucie Ice Co., Jacksonville, Fla., will build an addition to increase the capacity about 40 tons per day.

The Common Council, Cameron, Tex., has plans under way for a new municipal electric light and power plant, estimated to cost in excess of \$75,000. The Engineering Service Co., Sumpter Building, Dallas, Tex., is engineer.

The Town Council, Timpson, Tex., is arranging for the immediate installation of a new municipal electric lighting plant, estimated to cost about \$30,000.

The Central South

ST. LOUIS, Oct. 10.

The St. Louis & San Francisco Railway Co., Frisco Building, St. Louis, is taking bids for a one-story machine shop, 40 x 100 ft., on Chouteau Avenue, to cost about \$30,000. R. C. Stephens, company address, is architect.

The Ferro Enamel Supply Co., 1101 Swetland Building, Cleveland, manufacturer of enameling ovens and other equipment, is considering tentative plans for a branch plant at St. Louis. R. A. Weaver is president.

The Superior Ice Co., Lee Building, Kansas City, Mo., is having plans prepared for a new three-story plant at Second and Main streets, estimated to cost about \$145,000, including machinery. A. L. Williams heads the company. B. B. Ryan, company address, is architect and engineer.

The United Railways Co., Thirty-ninth and Park streets, St. Louis, will establish a new car repair works at Taylor Street and Broadway, in connection with the erection of a new office building at this location. It is estimated to cost about \$100,000. Colonel Perkins, general manager, is in charge.

The Nashville Pulp & Paper Co., Nashville, Tenn., has been incorporated under Delaware laws with capital of \$1,250,000 to manufacture paper products. It is proposed to build a local mill. The company is represented by the Corporation Trust Co. of America, du Pont Building, Wilmington, Del.

The Liberty Electric & Mfg. Co., 95 North Third Street, Memphis, Tenn., is having plans prepared for a new one-story factory. Bids will be asked at an early date. Regan & Weller, Bank of Commerce Building, are architects.

The Signal Mountain Portland Cement Co., James Building, Chattanooga, Tenn., is planning to call for bids during November for its proposed new plant, estimated to cost in excess of \$500,000, including machinery. Ralph Dow is head.

The North American Electric Lamp Co., 1008 North Twenty-second Street, St. Louis, has construction under way on an addition for the manufacture of carbon electric lamps. It will provide about 20,000 sq. ft. of space.

The Polar Wave Ice & Fuel Co., Grand and Olive streets, St. Louis, is arranging for a new ice manufacturing and refrigerating plant to cost about \$500,000, including machinery. H. G. Clymer, Wainwright Building, is architect.

The Common Council, Pawhuska, Okla., will proceed at once with plans for extensions and improvements in the municipal electric power plant, estimated to cost about \$112,000.

The Dixie Power Co., Title Guarantee Building, St. Louis, has made application for permission to build a new hydroelectric generating plant on the Buffalo River in the vicinity of Little Rock, Ark., with initial capacity of about 20,000 hp.

The Louisiana & Arkansas Railroad Co., Stamps, Ark., will soon take bids for its new locomotive repair plant, estimated to cost about \$150,000 with equipment. Harrington, Howland & Ash, Orear-Leslie Building, Kansas City, Mo., are architects.

Seattle

SEATTLE, Oct. 4.

The Ersted Machinery Mfg. Co., Portland, Ore., has purchased the plant of the Pacific Iron Works, comprising machine shop, foundry, pattern shop, etc., and will immediately occupy the premises. An adjoining site of about two acres has been leased for the erection of a two-story building to cost about \$22,000.

The Meskill Lumber Co., Chehalis, Wash., is said to be perfectly plans for rebuilding the portion of its mill, recently destroyed by fire with loss estimated at about \$75,000, including machinery. W. F. Downs heads the company.

The Portland Railway, Light & Power Co., Portland, Ore., is arranging for a bond issue of \$10,000,000, a portion of the proceeds to be used for additions and improvements to include the erection of a new hydroelectric generating plant on the Clackamas River, with initial capacity of about 75,000 hp. The authorized capital of the company has been increased from \$35,000,000 to \$47,500,000.

Fire, Oct. 3, destroyed the mill of the Canadian Lumber & Timber Co., Vancouver, B. C., operated in the name of the Vancouver Export Lumber Co., with loss estimated at about \$125,000, including machinery and power equipment.

The Klamath Iron & Steel Works, Klamath Falls, Ore., is planning to rebuild the portion of its foundry, recently destroyed by fire with loss of about \$20,000. B. M. Hall is general manager.

L. A. Murray, Portland, Ore., has filed plans for a new one-story metal-working plant on Hawthorne Avenue.

The Rattlesnake Lumber Co., Yakima, Wash., is planning to rebuild its mill, recently destroyed by fire with loss estimated at about \$60,000, including machinery. E. D. Evans, Naches, Wash., heads the company.

California

SAN FRANCISCO, Oct. 4.

The United States Metal Products Co., 330 Tenth Street, San Francisco, is having plans prepared for an addition, to be either two or four-stories and estimated to cost in excess of \$50,000.

The I X L Battery Corporation, Los Angeles, has been incorporated with a capital of \$25,000 by F. V. Alden, A. M. and M. H. Moore to manufacture electric batteries, etc. It

is represented by A. S. De Santis, 610 Title Insurance Building.

The Keystone Iron & Steel Works, Los Angeles, has removed to its new plant at 2931-3641 Santa Fe Avenue. It will specialize largely in the manufacture of steel castings.

The Great Western Meter Co., 105 Montgomery Street, San Francisco, manufacturer of gas and other meters, has plans under way for a one and two-story factory at Powell and Beaudry streets, Emeryville, 30 x 170 ft., and estimated to cost \$25,000. This will comprise an initial plant unit and other extensions will be built later. R. J. Lyman is president.

Fire, Sept. 29, destroyed a section of the plant of the Frank Graves Sash & Door Co., Los Angeles, with loss estimated at about \$200,000, including machinery. It will be rebuilt. F. T. Haward is vice-president.

The Republic Steel Package Co., 7930 Jones Road, Cleveland, has completed plans for its new works at Richmond, Cal., one-story, 60 x 300 ft., and expect to commence construction at an early date. Spur railroad tracks to serve the plant have been laid. L. F. Hyde, Oakland, Cal., is architect.

The Paramount Automobile Co., represented by Charles Hollingsworth, Oakland, Cal., is negotiating with the Chamber of Commerce at Vallejo, Cal., for a site for a new plant to manufacture pleasure automobiles and parts.

The California-Curtis Co., American and Willow avenues, Long Beach, Cal., is contemplating the erection of a new aviation plant, to include a complete mechanical department for airplane construction and repairs. Earl S. Daugherty is local representative.

The generally better tone of the Pacific Coast steel market seems to be reflected in machine tools to some extent, for the 10 days have witnessed a larger volume of business. Inquiries are increasing and many result in actual sales. Business thus far, however, is largely confined to the smaller types of machine tools. Second-hand machinery is still occupying the major interest of buyers.

Canada

TORONTO, Oct. 10.

A much better feeling is slowly making its appearance in the machine-tool markets and many interests are looking for increased business in the immediate future. The larger railroads are making arrangements to enter the market and also do a fairly large amount of construction work. The demand for equipment for replacement purposes is improving and sales of one or two machines are increasing. Wood-working machinery is also more active. Inquiries continue in larger numbers, but many of these appear to be sent out for the purpose of sounding the market. While prices on some lines of Canadian tools have recently been reduced, it is stated that quotations are about as low as they possibly can go for some time.

W. H. Johnson, Barrie, Ont., is in the market for a 20-in. drill, either new or second-hand, with automatic feed, for boring cylinders.

The Link Mfg. Co., Portage la Prairie, Man., is asking for prices on a 6-ft. shear, small punch press, key-seating machine, 6-ft. power brake, power drill, 14-in. lathe, a set of 4-ft. rolls, also an 8 or 10-hp. motor.

The Parker Motor Car Co., recently incorporated with a capital stock of \$10,000,000 has leased space in the plant of Caron Brothers, Longue Pointe, Montreal, for assembling cars.

The Anglo American Motors, Ltd., has secured a site at Trenton, Ont., and proposes to erect a manufacturing plant.

J. H. Bennett, of the Light & Power Commission, Barrie, Ont., states that the town will shortly install a 500-gal. De Laval electrically-driven centrifugal pump to supplement the present equipment in the waterworks plant.

The Hydro Appliances, Ltd., is establishing a plant at Port Robinson, Ont., to manufacture washing machines, etc.

The General Motors Corporation, recently announced that the manufacture of its entire line of export models, with the exception of the Cadillac and General Motors truck, will be concentrated at the Oshawa, Ont. plant. The reason for the change is that with all export trade under one head there should result a better realization of the necessities of the business and the production of a line of cars better fitted for export trade.

The Bay Mac Tire Co., Grimsby, Ont., is having plans prepared for a factory to cost \$15,000.

W. Taylor, 2454 Chabot Street, Montreal, is contemplating the erection of a foundry.

Albert Frances, Dunnville, Ont., is contemplating erecting a foundry at Port Colborne, Ont.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	2.78c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.78c.
Hoops, base price	3.88c.
Bands, base price	3.43c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base	2.88c.
Channels, angles and tees under 3 in. x	
¼ in., base	2.78c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.75c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.95c.
Toe calk, ½ x ¾ in. and larger	3.45c.
Cold-rolled strip, soft and quarter hard ..	6.75c. to 7.75c.
Open-hearth spring steel	4.25c. to 6.00c.
Shafting and Screw Stock:	
Rounds	4.03c. to 4.53c.
Squares, flats and hex.	4.53c. to 5.03c.
Standard cast steel, base price	14.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.88c.
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Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R. One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.80c. to 4.05c.
Nos. 22 and 24	3.85c. to 4.10c.	4.50c.
No. 26	3.90c. to 4.15c.	4.55c.
No. 28	4.00c. to 4.25c.	4.65c.
No. 30	4.25c. to 4.50c.
No. 28, 36 in. wide, 10c. higher.		

Galvanized

	Per lb.
No. 14	4.10c.
No. 16	4.25c.
Nos. 18 and 20	4.40c.
Nos. 22 and 24	4.55c.
No. 26	4.70c.
No. 27	4.85c.
No. 28	5.00c.
No. 30	5.50c.
No. 28, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black Galv.
½ in. Butt... —55 —40	
¾ in. Butt... —60 —46	
1-3 in. Butt... —62 —49	
3½-6 in. Lap... —59 —45	
7-8 in. Lap... —55 —41	
9-12 in. Lap... —54 —40	

Wrought Iron

	Black Galv.
¾ in. Butt... —30 —13	
1-1½ in. Butt... —32 —15	
2 in. Lap... —27 —10	
2½-6 in. Lap... —30 —15	
7-12 in. Lap... —23 —7	

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER Per Lb.

Bright basic	4.00c.
Annealed soft	4.00c.
Galvanized annealed	4.75c.
Coppered basic	4.50c.
Tinned soft Bessemer	6.00c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	15¼c. to 18¼c.
High brass wire	16¼c. to 20¼c.
Brass rod	13¼c. to 19¼c.
Brass tube, brazed	26½c. to 30½c.
Brass tube, seamless	18 c. to 19½c.
Copper tube, seamless	20½c. to 21¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 20½c. to 22½c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC..	\$10.75	\$9.25	80 lb...	\$6.80	\$6.55
IX..	12.00	10.75	90 lb...	6.90	6.65
IXX..	13.75	12.25	100 lb...	7.00	6.75
IXXX..	15.50	14.00	IC...	7.15	6.90
IXXXX..	17.00	15.75	IX...	8.15	7.90
			IXX...	9.15	8.90
			IXXXX...	10.15	9.90
			IXXXX...	11.15	10.90

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.50
IC	7.75
IX	8.00
Fire door stock	11.00

Tin

Straits, pig	30c.
Bar	36c. to 40c.

Copper

Lake ingot	15½c.
Electrolytic	15¼c.
Casting	15c.

Spelter and Sheet Zinc

Western spelter	6¼c. to 6½c.
Sheet zinc, No. 9 base, casks	11½c. open 12c.

Lead and Solder*

American pig lead	5¾c. to 6¼c.
Bar lead	6¼c. to 7c.
Solder, ½ and ½ guaranteed	20c.
No. 1 solder	18c.
Refined solder	15½c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	80c.
Commercial grade, per lb.	40c.
Grade D, per lb.	35c.

Antimony

Asiatic	6½c. to 6¼c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	29c. to 31c.
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Old Metals

Dealers report business more active with prices steadily moving upward. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	10.25
Copper, heavy and wire	9.75
Copper, light and bottoms	8.00
Brass, heavy	5.00
Brass, light	4.00
Heavy machine composition	7.50
No. 1 yellow brass turnings	4.25
No. 1 red brass or composition turnings	6.50
Lead, heavy	4.00
Lead, tea	2.50
Zinc	2.25

